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GAS JOURNAL

LIGHT • HEAT • POWER • BYE-PRODUCTS

[Founded in 1849 as the "Journal of Gas Lighting."]

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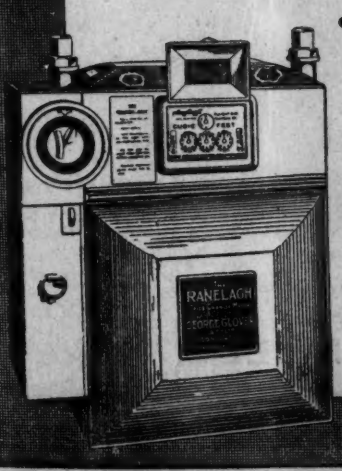

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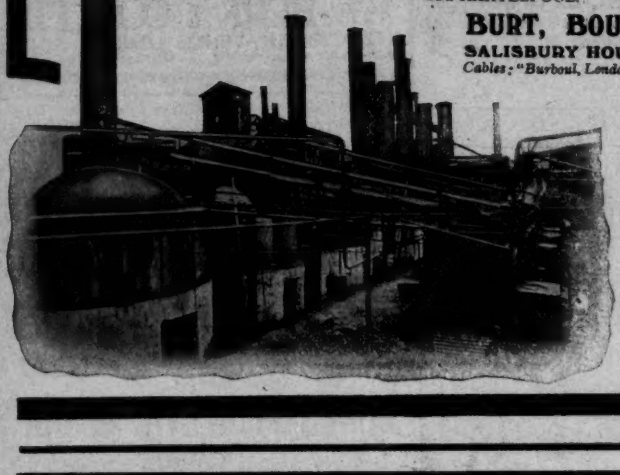

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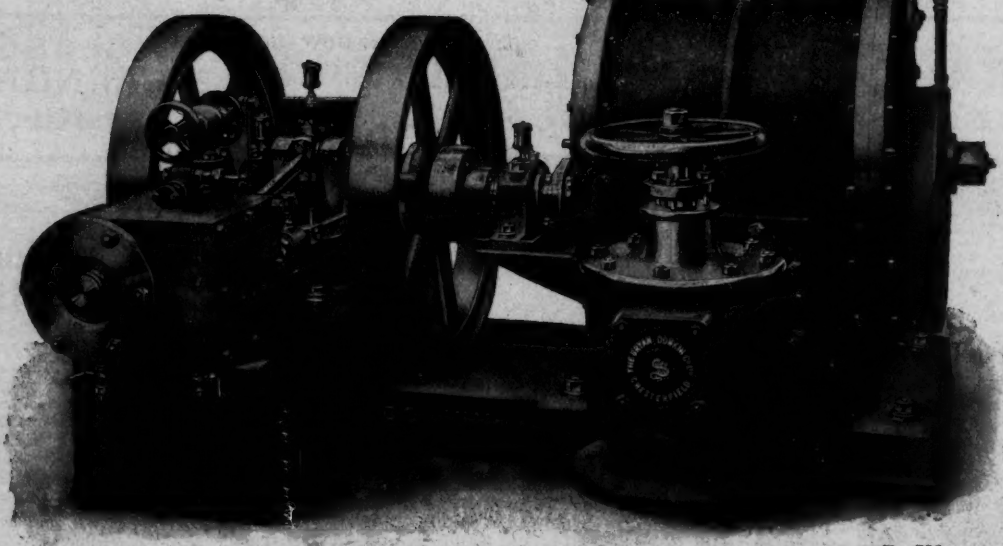

Fig. 782.

Gas Exhauster coupled direct to Horizontal Steam Engine (C Type) combined on the same cast-iron baseplate.

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VOL. CLXVIII., No. 3213.] WEDNESDAY, DECEMBER 10, 1924. [76TH YEAR.

EDITORIAL NOTES.

Organizing Good Service.

FUNDAMENTALLY there is before the gas industry to-day no more important question than the above. It is being widely considered and discussed; but action is not so prevalent as is desirable. Everywhere we hear of appliances being installed in greater numbers than ever. Yet competition was never keener, and it will become more so. The success of the gas industry alone will ensure that; the requirements of the competing industry for more day load in residential areas is an effective spur to the supplementing of the endeavours to bar our progress, and to take from us that which we have gained. The prosperity now being enjoyed carries with it increased obligations. It is the business of gas undertakings to leave nothing undone which can be done to retain the business obtained, and yet to secure more and more, and not to allow competition based on specious claims to offer serious obstruction, or to provide it with invitingly open avenues. There is always the danger, when things are going well, of being contented, and perhaps a bit indifferent; that is just the time when there should be careful scrutiny of the position, and effective action. Such a time is now; and therefore the paper which Mr. W. J. Sandeman, of Croydon, read before the Southern Association of Gas Engineers and Managers at their last meeting comes very opportunely. It constitutes a plea to review policy in connection with the sales and service departments; and there is much wisdom in it from beginning to end. We do not think that anyone can quarrel with its general tenor without laying himself open to the charge of being an obscurant and a back number in commercial policy. This is a matter which has had much thought and study by Mr. Sandeman for many years; and his ideas have developed with time and changed conditions. That is as things should be. "As things have been, so things may be" stamps the man who still lives in the past, who has not the capacity for determining the present, and who cannot cast his mind forward in an attempt to visualize the future, and to legislate for what his intelligence assures him is likely to happen—in certain events.

Mr. Sandeman lays it down as a sensible and basic duty of gas undertakings to get the public behind them; and the way to create sound public opinion and goodwill is to have the right policy and the right quality of service. These are the things which influence the public. The old theory that the work of a gas undertaking ends at the meter is a poor battered thing to-day, and in some places it is hardly recognizable as having had any existence or acceptance. Unfortunately that is not the case universally. But it will have to come unless gas undertakings at present suffering from inertia, unprogressiveness, and want of imagination have an ardent desire to go under. In formulating policy, it is necessary to get clearly in mind what constitutes service, in order that policy may be constructed on rational lines. We agree absolutely with the author and certain speakers in the discussion in their dissent from those gas managers who associate good service with a copious supply of free work in installing appliances. That is something altogether apart from service, and it is not good policy. Service is, however, associated with the installation—service through sound advice, proper installation by skilled and efficient workmen, and supervision to ensure that the job is left in a condition that is a credit to the concern. One reason advanced by Mr. Sandeman against free installation work is that it affects the price of gas, and the extent to which gas is used is very directly related to its price. We agree, but would add that the extent to which gas is used is also directly related to the degree of satisfaction that is obtained from it. In other words, the author holds that each section of the work of a gas undertaking should be made as self-supporting as possible; and a further view is that people do not appreciate that which costs them nothing. We are not sure that that can be accepted as a general truth; at any rate we should not advise Mr. Sandeman personally to put the view to any extensive test among his friends. If the dictum is limited to installation work, well and good; but it is in the time after installation that a fraction of a penny per therm on the price of gas for expending on a continuation of service will be found good policy and profitable. When people have gas-consuming appliances fixed, what they do appreciate is good service from them, and good service from all such appliances is something that is in the interests—present and prospective—of every gas undertaking. Inspection, expert adjustment, and advice promote satisfaction and maintain it. At Croydon a liberal policy obtains in connection with gas-fires. No matter whether the fires belong to the Company or the consumer, the former maintain them free of cost; and they have men on this work all the year round. We should go beyond this in respect of other appliances—not perhaps to the extent of maintaining them, but periodically adjusting and giving advice in regard to them. In our opinion, it would pay, and that opinion is based upon the number of gas appliances with which we have met in consumers' houses, in different gas companies' areas, which were working most inefficiently, and through which the users have taught us the full meaning of the term "execration." When they have been shown how little stands between them and the enjoyment of the full utility of the appliance, their attitude is completely reversed. But the last thing a consumer thinks much about is that his gas-consuming appliances need occasional attention to ensure efficient and economical service.

Good service by a gas undertaking is largely bound up with the efficiency for work of the staff and the craftsmen; and nothing but admiration can be expressed for the complete course of education and training which Mr. Sandeman has mapped out for those in his department, as described in the latter part of his paper.

Intermittent-Continuous Vertical Retorts.

AT their recent meeting, the Midland Association of Gas Engineers and Managers had vertical retort working before them in two forms—both in type and in methods of operation. It was a good thing that the paper by Mr. Frederick Shewring, of Stratford-on-Avon [*ante*, p. 653], was read before that of Mr. Charles F. Tooby, of Coventry (published this week), because, had the latter come first, it would have thrown into stronger relief some of the disadvantageous features of the working of the continuous-intermittent retorts at Stratford-on-Avon. Mr. Shewring has courage in telling the story of his experiences with these retorts—continuous in gas making; intermittent in charge and discharge. But it would be totally unfair to judge the system from the paper, as the plant is admittedly in an unsound condition, and so is not accomplishing what it would undoubtedly be able to do were it in better state. Neither for selection nor construction of the plant is Mr. Shewring in any way responsible. He simply inherited it, and is making the best he can of it—knowing that the results he obtains and have to offer are not such as are usually realizable by

vertical retorts of structural soundness. No one will suggest that with steaming, even with the coals used, a make of 15,385 c.ft. of 442 B.Th.U. gas (or 68 therms) is good; and an inert content of 29 p.ct. is not a condition that Mr. Shewring or any other discriminating gas engineer can contemplate with equanimity.

The results conclusively show two things—that the structural conditions of the settings are now not what they should be, and that the method of working is not conducive to the best results. These are indicated by Mr. Shewring in the paper and in his reply to the discussion. The coke is drawn every three hours in about 6 cwt. quantities. When this occurs, there is a fall of the remainder of the charge, which creates fissures in it, and allows a more rapid passage of the gas. The fissures are opposed to efficient steaming, as owing to them some of the steam escapes decomposition. The only good result which appears to arise from this is that an open-textured coke is secured, which is very popular as a fuel for domestic purposes. No less than 9·3 cwt. of coke is sold and cash actually received for it. It is remarked that the highest combustion chamber temperature is 1290° C.; and the average temperature at the outlet damper is in the neighbourhood of 950° Fahr. (510° C.). It is a pity that some of the temperatures are rendered in Centigrade and others in Fahrenheit. That by the way. No great complaint can be made of the outlet temperature, and of a large proportion of heat being wasted, though there was a little criticism of the point by Mr. C. M. D. Belton, through a misunderstanding as to the 920° Fahr. being 920° C.—that is, if our report of his remarks has not erred. The fuel account in the circumstances—having regard to the steaming—cannot be high with 9·3 cwt. of coke for sale. The worst feature of all is the quantity of inerts which runs the make per ton up to 15,385 c.ft. of 442 B.Th.U. gas from the class of coal used in these retorts. If the inerts could be brought down from 29 p.ct. to 9 p.ct., the volume of gas would be reduced by 20 p.ct., or to 12,308 c.ft. of a higher calorific value per cubic foot. There are indications in more than one part of the paper that the high content of incombustibles is due to the system of discharge. The analysis of the gas suggests it, as does also the fact that the need for scurfing is infrequent. The latter is due to steam and air being swept up the sides of the retorts during the discharge of the coke; and this, combined with old-age defects in the settings, accounts for the high percentage of inerts. Nevertheless, with all the drawbacks of this plant, Mr. Shewring is able to maintain a fairly level quality in respect of calorific value—between 425 and 440 B.Th.U. That he is able to do this with the plant testifies to good management. But over-all the results are not anything like he would wish them to be, and as they would be were he in possession of plant in different state—plant permitting of other methods of operation, and more congenial conditions inside the retorts, so that efficient steaming could take place.

A Study of Vertical Retort Operation.

The paper which Mr. Tooby read at the same meeting treated of the working of the Glover-West continuous vertical retorts at the Foleshill Gas-Works of the Coventry Corporation. The paper is something more than a mere account of the results of the operation of the retorts; it is a study of the conditions affecting the results, and as such will be highly useful in directing the attention of other engineers to several important matters which should be both investigated and borne in mind. This is no new study for Mr. Tooby. He has been, as his chief (Mr. P. N. Langford) reminded the members, engaged for some considerable time on research into the relative values of different carbonizing systems. To this our columns in December, 1919, testified; Mr. Tooby then making an important contribution, under the *nom de plume* of "Works Manager," on the "Net Cost of Coal for Various Systems of Gasification." That title alone directs attention to one factor that should weigh—perhaps not so much in the selection of a system of vertical retorts as in their operation. The continuous vertical retort with steaming has given, combined with a reduced cost per therm in gas, an excellent latitude in the matter of regulation, inasmuch as, as Mr. Tooby points out, there is a rapidly increasing economy in steaming as the value of coke per ton decreases; and the converse holds good. When, too, the market for coke is friendly and the value high, steaming assists in the maintenance of that condition by reducing the quantity of available coke—providing the competition of coal of the lower values does not interfere with this process of coke regulation in relation to the market. The same thing, of course, obtains in the operation of horizontal retorts with water gas production; but in the Coventry experience there is a material difference in the cost of the therm so produced—even with carburetted water gas, which, on the therm basis, is to-day cheaper than blue water gas, with oil at the current price. Circumstances, of course, alter results, as is proved by Bath and other places where with horizontal working and carburetted water gas the cost per therm in gas is lower than at some places where vertical retorts and steaming are in operation. It is difficult and dangerous to dogmatize in these matters.

However, there is no question that steaming in continuous vertical retorts has entirely changed considerations and outlook regarding carbonizing plant. The conversion of the steam into gas has called for higher temperatures, and a change in our ideas as to regional variation in the application of heat to the retorts. In construction, materials of a higher refractoriness are required than before steaming became an economic vogue; and the knowledge that high bottom heats are essential for realizing the best efficiency in the cracking of the steam and in gas production has received adoption. However, notwithstanding the advance of knowledge regarding the steaming of vertical retort charges, it cannot be said that we are more than on the threshold of possibilities in this regard. Good progress has been made, and certainty of operation has displaced that which was more or less empirical; but still we cannot yet say where this is going to lead. It would ill become us to think that in this matter the ultimate has already been attained; and we are far from saying that it is. While vertical retort and steaming progress has up to a point altered the position of water-gas plant, the change is in some respects due to the present value of coke and the price of oil, which conditions may be altered at any time. The relative positions will always now be primarily judged for ordinary working on the price of the therm, though the relative capital costs and the emergency value of the water-gas plant will never be overlooked in the equipment of a gas-works, as its possession means safety. It is true that at some works water-gas plants have been let down and are now purely stand-bys, but at others a very large proportion of the capacity is still being worked in conjunction with horizontal retorts.

Reverting, however, to Coventry experiences. As the author shows, they have been somewhat limited as to the amount of steam they could put into the retorts (through having in use the original form of waste-heat boiler); nevertheless, by slightly reducing retort throughput, excellent results in therm yields and costs have been obtained, to the end that therms have been put into the holders at a substantial reduction—including repairs and maintenance, general upkeep of works, and manufacturing salaries. In 1922-23, with horizontal retort coal gas, the net cost was 3·44d. per therm; and carburetted water gas, 4·81d. In 1923-24 with 54 p.ct. vertical retort coal gas and 46 p.ct. horizontal coal gas, the net cost was 2·89d., and carburetted water gas still 4·81d. That is a valuable reduction; and there is indication in it that Coventry is well persuaded by the light of its present experience as to which course it should pursue. There will be further improvement when the steaming arrangements are changed. So far there has been a handicap in securing the best results. Each setting has a small waste-heat boiler of the water-tube type; but these are doomed. Priming troubles and inefficiency have had condemnatory effect; and when extensions are being made, the boilers will undoubtedly be scrapped and a type installed which will take the waste gases from a number of settings, as is the modern practice. Incidentally, it is interesting to note—in view of the still prevalent opinion in some quarters that continuous verticals are restricted to coals of certain physical characteristics—that at Coventry on the average twenty different coals are carbonized each week, and frequently as many as ten different classes are elevated to the bunkers on the same day.

The concluding section of Mr. Tooby's paper merits particular attention. There, as in other parts, he gives some highly interesting and important results from his own researches. Other writers have pointed out the fundamental difference there is between the condensation of gas from horizontal retorts and from steamed verticals. In the condensation of gas from both systems, the quantity of latent

heat made sensible by the condensation of the vapours to liquid products is much greater than the quantity of the sensible heat of the gas and liquid condensates given up in cooling to the temperature at which each leaves the cooling system, and in the case of steamed verticals the former becomes relatively very great. The results of Mr. Tooby's tests are all carefully presented in the paper. From a tabulated statement, it is apparent that approximately 2·6 times the amount of latent heat from the condensation of water vapour has to be dealt with in the condensation of vertical retort gas compared with that in the case of horizontal gas. This ratio would be nearly the same for the total heat to be dealt with in the two cases, since the latent heat constitutes such a large proportion of the total heat.

The paper is excellent in every part; and the work it represents will be best appreciated by those who are accustomed to give expression to an accumulation of data in charts and tabulated statements. From their study, much interest and information will be derived.

Live Steam in Purification.

ONE of those useful little papers on a detail of operation which increases the efficiency of a works' process was read at the recent meeting of the Southern Association of Gas Engineers and Managers. It was by Mr. F. J. Pearce, of the North Middlesex Gas Company, and was on the subject of the use of live steam in purification at periods of low atmospheric temperature, with the view of maintaining the activity of the oxide. Directly such a method of doing this is suggested, one gets visions of naphthalene troubles, a super-moist condition of the oxide, caking of the material and back pressure, and what not. This was so on the present occasion; objections of the kind being advanced and alternatives suggested (which themselves may in some respects be objectionable). But in the result Mr. Pearce stands with his experience of comfort and improved purification unaffected; and despite what his critics had to say, he will no doubt go on (with the endorsement of his chief, Mr. Lawrie Trewby) admitting live steam to the purifiers when necessary, until something superior turns up. He admits that there are disadvantages, but the advantages largely preponderate. Therefore, no one can blame him for adhering to his method until someone can offer him something better. It would undeniably be preferable to have a method that would give the advantages without the disadvantages; for admitting live steam, even in regulated quantities, must produce a considerable quantity of condensate to be removed from the inlet syphons. Some engineers prefer a steam coil to maintain the temperature and activity of the oxide; but with this there is the danger of the oxide becoming very dry, with the liability of fire. Perhaps there is something worth investigating and developing in the idea submitted by Mr. J. Wesley Whimster as to a heat interchange between the gas as it is made and the gas as it leaves the exhausters before going to the purifiers. At any rate it supplies an opening for experimental work. One feature of the discussion is that while certain speakers had tried live steam in raising and maintaining the temperature of their purifier oxide, not one spoke as to the nature of the advantages that they had found, so that it is impossible to put their experiences completely in comparison with those of Mr. Pearce. His results are set forth in detail; and there can be no denial that they disclose, in the absence of something which will be an improvement, effects which have so far justified the trouble incurred. We will not enter here into the details of the experiences and data supplied in the paper and the discussion; they are presented so concisely that doing so would serve no good purpose.

A Jet Calorimeter.

BADLY wanted is a simple and easily manipulated jet calorimeter for works control of calorific value. There have been several attempts to satisfy this want; but nothing has hitherto come along which can match the old handy jet photometer, which did yeoman service for many years in assisting readily to govern the illuminating power of gas. The work that has been done in this direction has been valuable, if unsuccessful in filling the want. It all shows how diligent are the research workers in first seeing a need, and then applying themselves with a fine ingenuity to the effort of meeting it. Failure has merely been an inducement to other workers to try to achieve success. Through the courtesy of Prof. R. V. Wheeler, we were able to reproduce in our columns last week a description of a form of jet calorimeter which obviously can be said to be simple and easy of manipulation—in fact, we may go so far as to say that nothing previously devised approaches so near as this one to the characteristics of the jet photometer. That is precisely what is required. But at present we can go no farther in its praise. Past experience has taught caution in these matters, as devices which on first blush have been considered promising, though of complicated design compared with the one that Mr. Payman has placed before us, have, with trial in different circumstances, shown that in some respect they are deficient, and have not universal applicability. Whether this new jet calorimeter will be able to prove its veracity—that is to say, sufficiently approximately for works purposes—time alone can disclose. There is no question that Mr. Payman is convinced that the device will justify itself in different circumstances, as he says it will form an "extremely useful appliance" for use for works control of calorific value. We trust that it will prove to be so; and, pending trial in varying circumstances, we see no reason why it should not be, for it is based on theoretical conditions and considerations which are generally approved, and which have provided the way to simplicity in structure and manipulation. Every step which led up to the design and the utilization of flame measurement for the purpose of assessing approximately the calorific value of gas was proved by experiment. Briefly as to those steps. In the first place, it is accepted that the calorific value of a gas is proportional to the amount of air it requires for its complete combustion. To assure that this is so, experiments were made in which the heights of flame were plotted against the calorific values of the gases used. Within certain limits a straight line was obtained, proving that the size of flame produced at a jet by a non-aerated gas is directly proportional to the volume of air required for the complete combustion of that gas, and therefore to its calorific value—providing (mark this) that the gas does not contain more than a limited proportion (probably a third of its volume) of hydrogen. This suggests that there are circumstances in which the new device would not be applicable, but that the field of application would still be fairly large. The construction of the apparatus, as described last week, is as simple as is the ease of ascertaining at a glance the approximate calorific power. It is very ingenious; and if it justifies itself in all normal circumstances, the inventor will have supplied to the gas industry something for which it has been looking. There will no doubt be a desire in several places to make working trial of the instrument. Should this be done, a service will be rendered to the whole industry by publishing in our columns experiences, checked by ordinary calorimetric tests.

The Heathfield Prospectus.

Will correspondents kindly note that our waste paper basket has been filled to overflowing with copies of the present issue of the prospectus of the Heathfield and Waldron Gas Light and Coke Company? This intimation will save further expenditure on postage, as there is nothing to add to the views already expressed by us on this impudent document. But we shall be glad to receive copies of any fresh issues from 43, Cannon Street, or elsewhere, which do not commend themselves to those with knowledge of gas and kindred undertakings. Is anything being done to warn those holders of shares and stock in well-established gas undertakings—holders without that knowledge—against investing in concerns which invite applications for capital without giving specific information as to business done and profits earned, but which will be much over-capitalized while hinting at dividends of extraordinary magnitude?

Views of a Pestered Recipient.

The group of company promoters who issue the Heathfield and similar prospectuses receive, we have reason to know, some of them back again endorsed with anything but complimentary remarks. Through an error in the address, a copy has reached us from the provinces, bearing the following remarks: "This is the *eleventh copy* of this prospectus which I have received at my private address. If you are trying to place your stock by this method, you will find the public will not stand for it. If this is a

mistake, your organization is so bad that the public could have no confidence in your management." We hope Messrs. Calvert, Mann, Bulk, Newman, and the prime movers in connection with the different Corporations and Trusts at 43, Cannon Street, will note this message, which has obviously lost its way.

Wembley Again Next Year.

The Executive Council of the British Empire Exhibition have decided to continue the exhibition next year. An important factor in the Council's determination to agree to continue the exhibition for another year was the offer of the Government to increase their guarantee from £600,000 to £1,000,000. This extra assistance has influenced the Dominions and Colonies to renew their patronage. It is stated that as regards the Palace of Industry, it is certain that it will again be filled to overflowing. A serious problem is the Palace of Engineering. There were 400 exhibitors in that section; and their costs this year—including expert attendance—were very heavy, while immediate returns are highly problematical. So far some are favourable to continuing another year; others are not. Therefore this section at present constitutes the most critical one in the whole show. About May 1 is provisionally the period at which the opening will take place.

Smoke Abatement Bill.

There seems to be little prospect of the new Government willingly taking in hand the introduction of a Smoke Abatement Bill next year. This has been ascertained by a letter which Lord Newton, as President of the Coal Smoke Abatement Society, addressed to the Minister of Health, the Right Hon. Neville Chamberlain. The reply of the latter was to the effect that the Government contemplate introducing a Bill as soon as possible; but there is some doubt as to whether it will be desirable to do so in the coming session, in view of the urgent measures which must be passed into law. By waiting until 1926, Mr. Chamberlain says he should hope to secure for the Bill an earlier place in the programme of the Government. That is not very promising. Perhaps a little pressure might induce the Government to deal with the matter during the coming year. Newspapers and individuals all over the country are taking a great interest in this matter of the smoke contamination of the air. The representatives of some 66 local authorities in the Manchester and District Town Planning Area have met, under the chairmanship of the ex-Lord Mayor of Manchester (Alderman W. T. Jackson), and have appointed a Committee, whose endeavours will be directed to bringing about a uniform administrative system in connection with smoke abatement. The movement is growing larger and more influential.

Twenty-Ton Coal-Wagons.

The advantages of carrying coal in 20-ton wagons where such can be appropriately dealt with have long been recognized by engineers; but, of course, it has not been possible to scrap old stock to give place to the new until wear and tear has completed, or will complete, its work. But 20-ton wagons are now growing in fashion, with financial benefit. Fifteen months ago the Great Western Railway Company invited the owners of wagons to co-operate with them in the introduction of those of larger capacity; and they offered a rebate of 5 p.ct. off railway rates for coal class traffic passing wholly over their system, in fully loaded 20-tonners. From the 1st inst. the rebate has been extended to tipping, weighing, and wharfage charges on coal dealt with at the docks owned by the Company. The reconstruction of the coal-tipping appliances in South Wales is proceeding rapidly; facilities for handling 20-ton wagons being already available at Newport, Cardiff, Barry, Port Talbot, and Swansea. It is expected that early in the new year the higher capacity wagons will be much in evidence in the South Wales coal trade. In a large programme for the construction of new locomotives, carriages, and wagons, the London and North-Eastern Railway Company have included 11,700 new wagons, at an estimated cost of £2,300,000. This includes 200 30-ton wagons, 1400 covered wagons, and 4000 coal wagons of from 12 to 20 tons capacity.

Coal and German Competition.

The Marquis of Londonderry, at the recent Festival Dinner of the Coal Trade Benevolent Society, spoke of the position of the coal industry and the outlook. Under the influence of political uncertainty and other disturbing factors, the industry has languished; but with a settled Government and consequent greater confidence, a new spirit is being infused into enterprise, and this must result in renewed prosperity. Up to a point this is comforting; but there is a less sanguine feeling regarding the future when other factors are taken into account. Lord Londonderry admits that if the wheels of industry are to be greased in this country, it must be by cheap coal. This is a difficult problem, but a solution will have to be found. Semi-official reports on the situation in Germany make those concerned realize that the competition with Germany is likely to be formidable. The wages of German coal hewers are about one-half of the average wage of the British miner; and eight hours are worked below ground and about eight-and-a-half above ground. Cheaply produced lignite is used for home consumption; and this enables a large quantity of German coal to be available for export. The coal producing companies in Germany have also been enormously assisted by the practical disappearance of the old German mark, which has enabled them to get rid of their pre-war debenture debts for almost nothing. This is evidence that there are factors assailing the position of the British coal industry which the Government, the coal owners, and the Miners' Federation cannot alter, but to ameliorate which something could be done by the owners and miners working in collaboration. But the latter do not feel disposed to collaborate. Even if they recognize the character of the malady, they are not willing to help to administer even a partial cure to enable the industry to get into a stronger competitive position. Thus it is that the whole industry suffers, including the miners themselves.

Trade Union Membership.

A White Paper has been issued giving a statistical summary of the operations of registered trade unions for 1923. It was prepared by Mr. G. Stuart Robertson, Chief Registrar of Friendly Societies. This is a preliminary publication, and any adjustments which may be necessary will be made in the report of the Registrar for the year. However, the summary shows there was last year a further decline in membership of the trade unions. In 1920 the membership reached the highest point it has yet attained. The figures show that the numerical recession last year compared with 1922 was 145,578, and no less than 2,568,161 as compared with 1920. These are the actual aggregate membership figures: 1920, 6,981,750; 1922, 4,559,167; 1923, 4,413,589. Income from members: 1920, £11,315,232; 1922, £8,988,822; 1923, £8,086,802. Allowances from Ministry of Labour (unemployed insurances, &c.): 1920, £312,024; 1922, £5,448,721; 1923, £2,649,364. Income from other sources: 1920, £1,372,320; 1922, £1,000,000; 1923, £653,281. Funds at the end of the year: 1920, £15,974,790; 1922, £10,008,064; 1923, £10,888,500.

PERSONAL.

At their meeting on the 2nd inst., Mr. JOHN TERRACE, Chief Engineer to the South Suburban Gas Company, was elected a member of the Institution of Civil Engineers.

Mr. G. P. MITCHELL, the Blackburn Corporation Gas Manager, has been elected a member of the Institution of Mechanical Engineers.

Mr. ALFRED T. WATSON has been appointed Engineer and Manager of the Rushden and Higham Ferrers District Gas Company, to succeed his father, whose death is noticed in this issue.

Mr. WILLIAM HAMBY, the Secretary of the Sheffield Gas Company, is retiring at the end of the present year. He has been in the Company's service for 43¾ years, and was appointed Secretary in October, 1909. The Board have appointed Mr. RALPH HALKETT, the present General Manager, to be General Manager and Secretary.

The Council of the Society of Engineers have decided to recommend the award to Mr. W. J. LIBERTY, Secretary of the Institution of Public Lighting Engineers, of the "Nursey Premium," value £3 3s., for his paper on "Underground London," read before the Society at their autumn meeting.

At the annual staff dinner of the Bradford Corporation Gas Department, held at the Parade Café, on Nov. 27, under the chairmanship of Mr. Charles Wood (the Engineer and General Manager), who was supported by Councillors George Walker and F. Wilkinson (Chairman and Deputy-Chairman of the Gas Committee), Mr. JOHN WHITAKER (Chief Clerk in the Department), who is shortly to retire after 48 years' service, was presented with a chair. Mr. JOHN LANG (Manager of the Clayton Gas-Works

of the Department) was presented with a gold watch to mark his completion of 44 years' service.

Sir WILLIAM ALEXANDER having resigned his position as Chairman and Director of the British Dyestuffs Corporation, Ltd., Lord ASHFIELD has been appointed Chairman. Hitherto Lord Ashfield has been one of the two Government representatives on the Board, but he now becomes an ordinary Director, and his place as a Government representative is taken by Sir ALFRED MOND.

We learn that Mr. J. H. WILLIS, A.M.I.Mech.E., has left the service of the Birmingham Gas Department, to take up a position with Messrs. Alexander Comley, Ltd, Coal Contractors, and Agents for Messrs. Clayton, Son, & Co., of Leeds. Mr. Willis has been on the technical staff of the Birmingham Gas Department for the past twelve years.

OBITUARY.

Mr. OLIVER PIPER, who has died at Passage West (co. Cork), was Chairman of the Queenstown Gas Company. He was born in London in 1855.

Mr. JAMES WHITAKER, Secretary to the Boston Spa Gas Company for the past 23 years, died rather suddenly at Branham last week. In addition to his secretarial appointment, Mr. Whitaker was Assistant Overseer and Collector of Rates for the townships of Boston Spa and Clifford.

We regret to announce the death of Mr. THOMAS WATSON, Engineer and Manager of the Rushden and Higham Ferrers District Gas Company, who died of heart failure on Dec. 1, aged 72. Mr. Watson was born in Edinburgh; and in the course of an interesting career spent many years abroad. During one period he managed a gas undertaking in South America, and for seventeen years was Engineer and Manager to a gas company in Gibraltar. It is 27 years since he took up his duties at Rushden, where his services have been greatly appreciated.

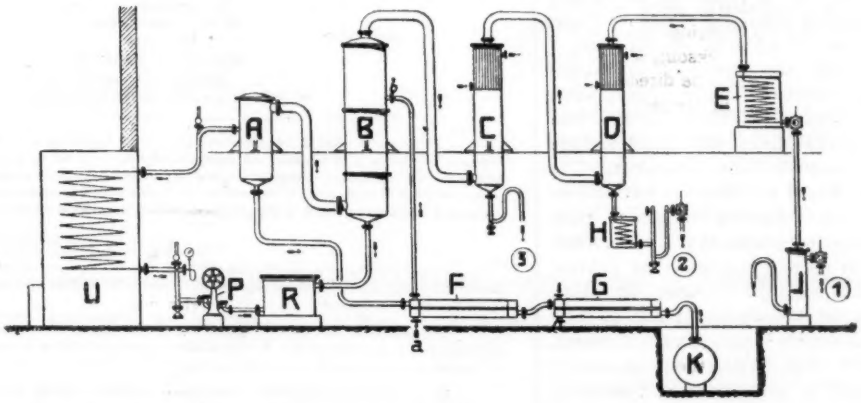
Mr. GEORGE SCRIVENS, Distribution Superintendent to the Cheltenham Gas Light and Coke Company, died on the 29th ult., after having undergone a serious operation. Mr. Scrivens joined the staff of the Company twelve months ago, and was known to a number of those who have attended the meetings of the Salesmen's Circle in Birmingham.

The death has taken place at Folkestone of Mr. C. A. HEAD, a Deputy-Lieutenant of the North Riding. Mr. Head, who was in his 87th year, was the founder in 1860 (with the late Sir Thomas Wrightson) of the firm of Messrs. Head, Wrightson, & Co., Ltd., of Thornaby-on-Tees. He took an active part till recent years in the public life of Thornaby, and was an ex-Alderman and Mayor of the borough. He was a Director of Messrs. Dorman, Long, & Co., of the Cleveland Trust, and of the Bowesfield Steel Company.

WASTE HEAT AND BENZOLE RECOVERY.

In "Brennstoff-Chemie" for Nov. 15, C. H. Borrmann, of Essen, described a new process, which is protected under a German patent, for the utilization of waste heat for benzole recovery. The author assumes that, in most cases where benzole is produced, large quantities of flue gases from coke-ovens or retort-settings go to waste at a temperature of some 500° C., which, however, are not easily adapted to the generation of the high-pressure steam required for the ordinary benzole-recovery process. It is proposed to use this available heat, without the intermediate generation of high-pressure steam, by performing the wash-oil distillation by direct heating with the waste gases. By a suitable system, the wash-oil is continuously heated to 250° C. In this way practically all the benzole is vaporized, and with it a portion of the wash-oil; and the wash-oil vapours are used, in place of the steam, to separate the benzole from the wash-oil.

The process is shown diagrammatically in the accompanying illustration. The benzole-enriched wash-oil is introduced at A to



the heat-interchanger F, where it is preheated by the hot debenzolized oil. From here, it passes by way of *b* to the column still B, where it is treated by a counterflow of wash-oil vapours at about 250° C. from A. This vaporizes the greater portion of the benzole; and the wash-oil, with its small remaining content of benzole, passes, by way of the intermediate container R and the pump P, to the heating system in the oven U, which is heated by waste gases at 400° to 500° C. Here the wash-oil passes in continuous stream through a tube-system of special design, and in the opposite direction to the heating gases; and in a very few minutes it is raised to about 250° C. At this temperature it reaches the vapour separator A, where it gives up, as vapour the rest of the benzole, as well as part of the wash-oil, before flowing back through the heat interchanger F and the water cooler G to the container K, where it is ready for further use in the washing process.

As already shown, the vapours from A pass into the column still B, where they serve to drive the greater part of the benzole out of the enriched oil which arrives by way of *b*. The system is so devised that only light-oil vapours leave B at the top, while the higher-boiling oil fractions are recondensed in B, and taken on again by the flow of oil. The light-oil vapours from B pass to the purifier C, where, by cooling, they are freed of all the higher-boiling wash-oil fractions. The latter are drawn off by (3) into special cooling pans, in which naphthalene separates out by crystallization; and they are then ready for further use. Therefore, only purified benzole vapours pass out at the top of C; and, by fractional distillation in D and in the final condenser E, they are received at (1) and (2) as light and heavy benzole respectively.

In this way, it is claimed, mainly by the use of waste heat, the benzole is recovered from the wash-oil, and at the same time readily divided into several fractions of sharply-defined boiling points. The latter operation is facilitated by the very fact of the absence from the process of steam. The wash-oil recovered is entirely free from benzole, since it is treated in A at 253° C., a temperature at which complete vaporization of the benzole is assured, and at which none of it can recondense. No thickening of the wash-oil takes place, since there is no polymerization, such as is caused in other processes by the direct application of steam. The economy of the method is very favourable, owing to the absence of steam and the quantities of water for condensation entailed by its use. The reduction in size of apparatus and space required is also a consideration, for in the usual process it is in terms of steam volumes that measurements have to be made It requires 4 kg. of steam to treat 1 kg. of wash-oil, and 1 kg. of light-oil vapours have a volume of about 0·37 cub.m., against 1·66 cub.m. for 1 kg. of steam. In the same way, the cooling water required is very considerably less, since, in the condensation of 1 kg. of light-oil, only 135 calories have to be dealt with, against $4 \times 600 = 2400$ calories in the case of 4 kg. of steam. There is no danger of fire, since the heating apparatus can be separated from the distillation chamber proper. The heating of the wash-oil takes very few minutes, and is only up to 250° C., so that it does not suffer in any way. It is claimed that a saving in cost of about 50 p.ct. is possible as compared with the ordinary benzole recovery method.

Institution of Public Lighting Engineers.—The following resolution was submitted to the Leeds City Council last Wednesday, Dec. 3: "That the Engineer and General Manager be heartily congratulated on the honour conferred upon him in his selection as President of the Institution of Public Lighting Engineers for the session 1924-25; and that the Institution be invited to hold their annual conference in Leeds."

CENTENARY OF THE IMPERIAL CONTINENTAL GAS ASSOCIATION.

As the Thames has been described as liquid history, so may the Imperial Continental Gas Association, which this year attains its centenary, be in a sense described as gaseous history. Not merely do its records contain the story of the development of gas and electricity on the Continent, but they also, owing to its widespread operations and the high patronage with which its early beginnings were associated, are a mirror of the main currents of European history during the past century. The accuracy of this statement may be gauged from the fact that among the more important towns supplied by it with gas have been the following: Aix-la-Chapelle, Amsterdam, Antwerp, Armentières, Berlin, Bordeaux, Brussels, Cologne, Estaires, Evreux, Flushing, Frankfort-on-Main, Ghent, Haarlem, Hanover, Lille, Marseilles, Prague, Rotterdam, Toulouse, and Vienna.

Owing to the nature of the Association's contracts, which were for the most part monopolies for the supply of heat, light, and power in the districts which it served, electricity in its early infancy received the attention of the Association; in fact, the first important public buildings on the Continent to be supplied with electricity were the Royal Opera House and the Burgtheater in Vienna, where current was distributed by the Association in 1887.

INCEPTION AND EARLY DAYS.

As regards the actual date of the formation of the Association, negotiations were on foot in the early months of 1824 with Mr. F. E. Winsor (who in 1809 lighted Pall Mall with gas lamps, and was largely responsible for the formation of the Chartered Gas Light and Coke Company) in regard to the French patents for gas lighting belonging to him. These were finally purchased from him in 1825 for £5000.

The Association did not, however, take actual shape until the early days of December, 1824, when the prospectus (here reproduced in smaller size than the original, which was foolscap) was issued inviting subscriptions to the capital of the Association. The first meeting of the Board of Directors was held on Dec. 11, 1824, and in the "Courier" of Jan. 21, 1825, appeared an advertisement stating that: "The Association are ready to receive proposals for lighting any towns or districts upon the Continent, for which arrangements have not already been made, at their office, No. 29, St. Swithin's Lane, Lombard Street, London, and will for that purpose negotiate either with the Magistracies of such towns and districts, through their agents, or with individuals possessing local influence."

The first general meeting of proprietors was held on May 2, 1826; but, prior to this, on Feb. 16 of the same year, a deputation of proprietors interviewed the Board, and were told that works were in action in Ghent, Berlin, and Hanover.

A STURDY GROWTH.

After a troubled infancy, the Association showed signs of a sturdy growth, and ultimately went from strength to strength, until in its heyday (1913) it was supplying 12,095 million c.ft. of gas (342,484,000 cub.m.) and 2 million units of electricity per annum; while, in addition, through the subsidiary companies controlled by it, 4357 million c.ft. of gas (123,368,000 cub.m.) and 34 million units of electricity were being supplied. In 1835 the total paid-up capital of the Association stood at £251,666; but by 1906 the capital, both ordinary and debenture, amounted to £6,175,000.

Photograph of the Original Prospectus.]

IMPERIAL CONTINENTAL GAS ASSOCIATION.

CAPITAL, £2,000,000 STERLING.

PATRONS.

HIS EXCELLENCY COUNT LIEVEN,
Ambassador from His Imperial Majesty the Emperor of all the Russias.
HIS EXCELLENCY PRINCE PAUL ESTERHAZY,
Ambassador from His Imperial Majesty the Emperor of Austria.
HIS EXCELLENCY THE SIEUR RHEINHARD DE FALCK,
Ambassador from His Majesty the King of the Netherlands.
HIS EXCELLENCY COUNT LUDOLF,
Ambassador from His Majesty the King of the Two Sicilies.
HIS EXCELLENCY BARON GUSTAVUS ALGERNON STIERNELD,
Ambassador from His Majesty the King of Sweden.
HIS EXCELLENCY COUNT MOLTKE,
Ambassador from His Majesty the King of Denmark.
HIS EXCELLENCY COUNT DE VILLA REAL,
Ambassador from His Majesty the King of Portugal.
HIS EXCELLENCY THE BARON MALTZAHN,
Ambassador from His Majesty the King of Prussia.
HIS EXCELLENCY COUNT MUNSTER,
Hanoverian Minister.
BARON DE CETTO,
Bavarian Charge d'Affaires.

PRESIDENTS.

MAJOR-GENERAL SIR WILLIAM CONGREVE, BART. M.P. F.R.S.
MATTHIAS ATTWOOD, Esq. M.P.
ISAAC L. GOLDSMID, Esq.
MOSES MONTEFIORE, Esq.

CHAIRMAN.

MAJOR-GENERAL SIR WILLIAM CONGREVE, BART. M.P. F.R.S.

DIRECTORS.

THE HONOURABLE LESLIE MELVILLE.
Sir GEORGE ABERCROMBIE ROBINSON, Bart.
HENRY BONHAM, Esq. M.P.
THOMAS STARLING BENSON, Esq.
JOSEPH CLARKE, Esq.
NICHOLAS GARRY, Esq.
GEORGE CARR GLYN, Esq.
LIEUT. COL. GEORGE LANDMANN, R.E.
JOHN HORSLEY PALMER, Esq.
CHARLES FREDERICK MANNING, Esq.
THOMAS MEUX, Esq.
ROBERT MUNRO, Esq.
FREDERICK DANIELL, Esq.
CHARLES POULETT THOMSON, Esq.

AUDITORS.

A. W. ROBARTS, Esq. M.P.
ALEXANDER GOLDSMID, Esq.
Sir WALTER STIRLING, Bart.
THOMAS HARRINGTON, Esq.
HENRY WILLIAM SMITH, Esq.

BANKERS.

Messrs. SPOONER, ATTWOODS, & Co. | Sir WILLIAM CURTIS, ROBARTS, & Co.

HONORARY CHEMIST.

W. T. BRANDE, Esq. F.R.S.

COUNSEL.

E. B. SUGDEN, Esq.

SOLICITORS.

Messrs. J. & S. PEARCE.

FOREIGN SECRETARY

M. HENRY DES RIVIERES BEAUBIEN.

At a moment when British capital is superabundant beyond all former precedent, and when British enterprise is directed to all beneficial and practicable objects, it will not be surprising that, after the general adoption of Gas Illumination throughout England, and the evidence thereby attained of its value to the consumers, as well as of its advantage to those who engage for its supply, a Company should be formed for the special purpose of extending the benefit of this admirable system to the principal towns of the Continent.

Page 2.] It is evident that such an enterprise combines the twofold object of benefitting our neighbours and ourselves; for while it extends the employment of British capital, it confers increased happiness and comfort on the inhabitants of the Continent.

The formation of such a Company could not, therefore, but be honoured by the high and distinguished patronage which it has obtained from Foreign Ministers; nor could it fail to be received on the Continent with the universal encouragement which it has already experienced.

Much progress has already been made in arrangements for lighting the capitals and other principal towns of the Russian and Prussian Dominions, in Hanover, and the Netherlands; and in some of these countries terms have been adjusted between the Constituted Authorities and Sir W. Congreve, the Chairman, who is just returned from a mission to the Continent for that exclusive object.

Negociations are likewise in progress with Austria, Denmark, Sweden, and other countries, for the same purpose.

The Company will be modelled generally upon the following plan; but as alterations and improvements in the details may naturally be expected to suggest themselves in the course of carrying it into effect, the Directors reserve to themselves full powers in this respect, and the Shares are tendered to Subscribers upon the express condition, that they shall execute such Deed or Deeds as the Directors may deem requisite.

The Capital of the Company will be £2,000,000, divided into 20,000 Shares. No Proprietor, except Presidents, Directors, or Auditors, can receive more than thirty Shares.

The Shareholders will be required to pay £5 per Share on or before Friday, the 10th instant, into the Banking House, either of Messrs. Curtis, Robarts, & Co. or of Messrs. Spooner, Attwoods, & Co.

The remaining Capital will be payable at the times and in the instalments contained in the statement at the foot of this Prospectus, the Board of Direction retaining the power of postponing or remitting such of these instalments as they may think fit, should the whole of the Capital not be required to fulfil the objects and meet the exigencies of the Company.

The business of the Company will be conducted by four Presidents and fourteen Directors, of whom the Presidents will remain in office for life, or until retirement or disqualification. Upon a vacancy happening in the office of a President, it will be filled up from the Directors, the right of election being vested in the remaining Presidents and Directors.

Of the Directors, three will retire annually, and be replaced by other qualified Proprietors. The first retirement and re-election will be on the 2d day of May, 1826, when the Directors will determine among themselves which of them shall retire, and so in each succeeding year, until all the present Directors shall have been out of office, after which the three senior Directors will retire annually.

Two of the present Auditors will retire on the said 2d day of May, 1826, and two in each succeeding year, and be replaced by qualified Proprietors.

The qualification of a President, Director, and Auditor, will be, the possession of thirty Shares each, whilst in office.

The functions of the Board of Direction (which will be composed of the Presidents and Directors) will be such as are usual in similar Institutions, and will extend to the appointment and dismissal of all officers belonging to the Establishment (except Auditors), including Agents and Boards of Management abroad; and the Board will be authorised to enter into engagements with all Foreign Powers, and to make purchases and to enter into arrangements with any Foreigners, or other persons, for enabling the Company to carry into effect the objects of the Institution.

The Board of Direction will have the power of raising a further Capital of £500,000, by distributing additional Shares to that extent on the Continent; but such Shares to be exclusively devoted to Foreign Capitalists.

The first General Court of Proprietors will be holden on the 2d day of May, 1826, the business of which will be to receive the Report of the Board of Direction, as to the Concerns of the Company, and to elect three new Directors, and two new Auditors; and on every succeeding 2d day of May, a General Court of Proprietors will be holden for the same purposes.

At the Meeting in 1828 (if not before), a division will be made of the Profits of the Company, but the Board of Direction will have full power to declare a Dividend at the Annual Meeting in 1826 or 1827.

No Proprietor is to be permitted to attend General Meetings, or to vote in the choice of Directors or Auditors, unless he shall have been possessed of five Shares for six months previously thereto, or from the formation of the Company.

A progressive scale of votes will be established, commencing with five Shares; but no Proprietor is to have more than ten votes.

The Presidents for the time being will be the Trustees of the Funds of the Company.

Page 3] The Deed of Settlement will be forthwith prepared, and due notice given thereof by advertisement, which will also fix the period within which it must be executed by the Shareholders; and any Shareholders not executing within the time so limited, will forfeit their Shares, and the Instalments paid thereon.

In the Deed of Settlement a clause will be inserted authorising the Majority of Shareholders present at a General Meeting, to be convened in the manner therein prescribed, to alter, restrict, extend, or determine, any part of the foregoing Prospectus, or to provide for any extraordinary event.

PAYMENTS.

				£	
1824.—Friday	10 Dec.	Deposit		5	
					£5 per Share.
1825.—Tuesday	12 April	Second	Payment	5	
Tuesday	12 July	Third	ditto	5	
Tuesday	11 Oct.	Fourth	ditto	5	
					£15 per Share.
1826.—Thursday	12 Jan.	Fifth	ditto	5	
Tuesday	11 April	Sixth	ditto	5	
Tuesday	11 July	Seventh	ditto	5	
Thursday	12 Oct.	Eighth	ditto	5	
					£20 per Share.
1827.—Friday	12 Jan.	Ninth	ditto	5	
Wednesday	11 April	Tenth	ditto	5	
Wednesday	11 July	Eleventh	ditto	5	
Thursday	11 Oct.	Twelfth	ditto	5	
					£20 per Share.
1828.—Thursday	10 Jan.	Thirteenth	ditto	5	
Friday	11 April	Fourteenth	ditto	5	
Friday	11 July	Fifteenth	ditto	5	
Friday	10 Oct.	Sixteenth	ditto	5	
					£20 per Share.
1829.—Tuesday	13 Jan.	Seventeenth	ditto	5	
Tuesday	14 April	Eighteenth	ditto	5	
Tuesday	14 July	Nineteenth	ditto	5	
Wednesday	14 Oct.	Twentieth	ditto	5	
					£20 per Share.
				£100	

Whiting & Branston, Printers to his Majesty for the Prevention of Forgery, and Printers to the Imperial Continental Gas Association.

War Shock and After Effects.

In 1914 came the shock of the Great War, when the majority of the Association's stations fell into enemy hands, and subsequently the compulsory liquidation of the Association's interests in Germany took place. As a result, a large part of the capital was paid back to the proprietors and the debenture holders, so that to-day the total issued capital stands at £2,239,950, of which £1,976,000 represents ordinary stock, and the balance (£263,950) debenture stock.

Notwithstanding the shock administered to its system by the war, the Association has made a wonderful recovery, and is still the proud and esteemed possessor of large gas and electricity interests in France, Belgium, Holland, and in the Succession States formed upon the dismemberment of the Austro-Hungarian Empire.

A Treasured Tradition.

One of the most treasured traditions of the Association is the record of loyalty and good service with which it has inspired all connected with it. This is exemplified in many ways. One of the present Directors, Mr. H. G. Palmer, is the great-grandson of one of the Directors, Mr. John Horsley Palmer, whose name appears on the reproduced prospectus; while Mr. George Jessel (the son of the present Chairman, Sir Charles Jessel, Bart.), who has recently been elected to a seat on the Board, is on his mother's side the great-great-grandson of one of the original Presidents, Sir Isaac Lyon Goldsmid. The family represented by the present Chairman and Mr. George Jessel has an absolutely unbroken record of service on the Board since the formation of the Association, members of the family having rendered service to it in the capacity of Director for a total length of 116 years. As regards the employees, it may be mentioned that in 1907 the Association instituted a medal for 25 years' uninterrupted service, and to date it has been bestowed on 290 members of the staff and 1446 workmen.

It will be recalled that the Board have already announced their intention of paying, in addition to the ordinary dividend for the year, a special bonus dividend of 5 p.ct. after the accounts have been submitted in May next, so that the proprietors may receive some tangible mark of the Association's centenary.

ELECTRICITY SUPPLY MEMORANDA.

Co-ordination of Fuel Use.

The discussions there have been during and since the World Power Conference have revealed a distinct interest among technical men in the subject of co-ordination of the use of fuel with a view to the conservation of coal. Perhaps one ought to except the major part of electrical engineers who think only of fuel consumption in terms of coal, and cannot get beyond. We are a wasteful nation; and electricity producers and purveyors are the chief of sinners in this regard, for they not only persist in using coal and can find no place for anything else, but they strive to do business in domestic electric heating by giving at the consumer's terminals less heat energy per ton of coal consumed under the boilers at the generating station than he can get in useful heat at much less cost by burning the ton of coal in his own crude, though direct, fashion. The man who tries to push electric heating in such circumstances, is engaged in opposing the conservation of coal, and that is not a creditable performance. He should look round to see whether in this matter sources of collaboration do not exist. Those who seek will have no difficulty in finding them. Some electrical men have found means of improving their boiler-house efficiency by employing gas coke as part of their fuel—thus also contributing to the improvement of the air we breathe. The tonnage of coke used is a sufficiently approximate measure of the tonnage of coal that would otherwise be consumed, with destruction of all the products which are rescued by carbonization in closed vessels. Gas coke is not the only claimant to consideration. On the North-East coast the waste gases from blast-furnaces are used by the big electric power Company operating in that area. There is in that respect a co-ordination of fuel use which tends to the conservation of coal. In that direction we see that, with the object of finding an outlet for the blast-furnace gases which they themselves unable to utilize, a number of large Belgian iron and steel works in the Charlerol district have recently organized a concern known as the Groupement Electrique de Charlerol to generate electrical energy, and to supply it to existing electricity distribution concerns. Distributing undertakings can take a financial interest in this new undertaking; and both the Société Intercommunale Belge d'Electricité and the Société Gaz et Electricité du Hainaut have done so. In addition to coke, there is, as we have previously pointed out, the waste heat of gas-works to be explored with a view to ascertain whether this can be economically applied through the waste-heat boiler to electricity generation. Mr. G. M. Gill called attention to the matter in our "Correspondence" columns last week; and Mr. A. Hugh Seabrook has been doing something more than turning over in his mind whether or not this source of waste heat cannot be drawn upon with good effect, and gas-works become suppliers of electricity to the ordinary distributors. It is all very fascinating; and some men who look ahead see a new "bye-product" for gas undertakings (through the development of economy from waste) which will contribute to the reduction of the charges for gas. We hope this will not frighten our electricity friends. There is no intention that it should do so, because the desire in the gas industry is to foster all schemes which can show higher economy

and efficiency where waste exists. Pretty certain it is that there are striking developments ahead; and even the powers that be—including the Electricity Commissioners—cannot thrust aside potential schemes for helping the great ambition of conserving our coal resources by making the best use of them.

Waste and Expense.

Turning to house heating, it is the case with all agents for the purpose that they are apt to be used in a wasteful manner. This is always bad; but the more expensive an agent is, the worse is the waste for the pocket. As electricity is the most expensively produced heating agent in respect of the fuel expended in its production, the worse it is for our national fuel resources. The "Electrical Times" admits that if electricity is used wastefully for heating, when the consumer is faced by the bill at the end of the quarter, it suggests to him that electric heating is expensive. We are not surprised, because this is one of the things that is regarded relatively, and so regarded it is very costly. To meet this, the Stoke Newington Electricity Department has issued a leaflet; but we are afraid it will prove to be ineffectual in persuading consumers that heating rooms by electricity is not an uneconomical procedure. Why was the leaflet issued? The answer is as clear as anything can be. Because there has been complaint; and something had to be done in the endeavour to counteract it. The circular states in the first place—

> The popularity of electric heating depends to a very large extent on the bill at the end of a quarter. A satisfactory bill is dependent on the economical use of the electric stove or radiator. Waste of electricity, as in all other commodities, serves no useful purpose.

Thus one has to be economical with electricity for heating to secure a satisfactory bill. The more economical, the more satisfactory. But the economy has to be so drastic that there is dissatisfaction with the performance. Which is the worse—dissatisfaction with performance or dissatisfaction with the account? We are afraid both are fatal. Then a "few hints" are supposed to be given to the user. But we can only trace one. Here it is:

> When using electricity for heating, ventilate your room without draught. Heat readily escapes with a draught.

The fact is that electricity is so expensive relatively to other agents that besides practising super-economy with it, it must be protected against draughts. But these are not the only things that carry away heat. One cannot have a room bottle tight; that would be unhealthy. And what are we to do, when an authority like Dr. Leonard Hill tells us that what is wanted for health is moving air in a room? It acts as a tonic on the whole system; while in a room where there is not free circulation of air, the latter becomes stagnant and unhealthy. But what matters injury to health so long as the cause of complaint against the cost of electricity is reduced? Then we have this statement:

> One-bar electric fire costs 1d. per hour maximum; two-bar electric fire costs 2d. per hour maximum; three-bar electric fire costs 3d. per hour maximum. See that two or three bars are not being used wastefully, when one will keep your room at a comfortable temperature.

That, of course, assumes that electricity for heating is at a 1d. per KW.-H., which is five, six, eight, and even in some cases twelve times less than the cost of electricity for lighting, because as a heating agent it is dear. If gas is at 8d. per therm (some gas undertakings are now selling at 5d. and 6d.), 12,500 B.Th.U. are supplied for 1d.; and with the efficiency of a modern gas-fire 9375 B.Th.U. are distributed in the room—about two-thirds as radiant heat, and one-third as convected. A unit of electricity, used at 95 p.ct. efficiency, will only give to the room 3060 B.Th.U. Therefore for the purpose the latter is three times more expensive than gas. Of course, the electricians cannot help this. It is all due to the low efficiency of electricity generation. But circulars such as the Stoke Newington one convey a very straight message in addition to the one printed upon it.

The Ladies Take a Hand.

The influence of women in the matter of the appointments of the home is great; and this fact is being called to the aid of the electricity industry. More extensive use is to be made of women to deal with women; and the women of the industry are going to have their own organization through which they hope to take part in the business-developing fray. Perhaps they will show the men of the industry how to conduct their business better than they are at the present time. We referred recently to the new association that has been formed by the electrical ladies, and which has had the blessing of the Director of the Electrical Development Association (Mr. J. W. Beauchamp). The idea of a special Association for the ladies connected with a public utility industry is quite a new thing; but, of course, the employment of ladies as demonstrators is not new in the gas industry. They have been employed from the days of the advent of the gas cooker, as those responsible for the promotion of the interests of gas undertakings realized that the gas cooker was an innovation, and education in its efficient management was important to its progress in service. The cookery and domestic economy schools were soon equipped with gas cookers, and from that time the more progressive gas undertakings have had lady demonstrators on their staffs. There is a sublime belief in the electricity industry that all that is wanted is the education of the women of the country to make the electric cooker displace the great multitude of gas-cookers. Expression to this effect is found in one of our electrical contemporaries. The writer says: "Obviously then what is wanted is education and still more education of all classes of women, to make it clear to them that the electric cooker is healthier, more reliable, and more manageable than the gas-cooker or coal range, and infinitely less dangerous." We will not trouble about the last four stupid words—just after reading of the death of a man who received a shock from a wire connected to a portable electric lamp. But really we cannot see how an electric cooker can be healthier, more reliable, and more manageable than the gas cooker. The point as to reliability is particularly funny; and the electric cooker is far behind the range of operation of the gas cooker. We see no word as to relative economy in the quoted sentence. It is as well perhaps, as it vastly worries electrical folk to count up how many units of electricity are required to equal a therm. No Association of electrical ladies can alter that physical drawback which represents much in the household economy.

Great Ambitions.

But as to this new Association. The electrical papers have published fuller reports of the meeting at which the decision was arrived at to inaugurate such an organization; and so fresh particulars are available. The credit for the idea of originating the Association is due to Mrs. M. L. Matthews, who is a graduate of the Institution of Electrical Engineers. The object of the organization is to accomplish something which is described by electrical lips as "a social reformation," by popularizing the use of electricity in the home. It is said that facilities "must be" provided for wiring houses—not only large ones, but cottages as well. The ambition is great. Mr. Beauchamp, with all the effort put forward by his own Association, acknowledges that there is an immense amount of work to be done; and without the help of the ladies, it cannot be accomplished. The difficulties with which men have been confronted will be no less because women are going to band themselves together, in the hope of succeeding where men have so largely failed. The servant shortage and the value of electrical labour-saving appliances constitute one of the lines of attack. By the use of electricity, woman's "burden" is to be lightened, and her labour lessened. Apparently the middle-class and working-class women are to be taught by the ladies not to look to the cost side of doing things electrically—such as heating rooms and cooking on the hotplate. It would be interesting to hear a working-class woman's interpretation (with her husband's income of £2 to £3 a week when in employment) of Mrs. Matthews' philosophic remark: "The average middle-class housewife and prosperous working woman are very shrewd and thrifty persons, but are very apt to overlook the fact that the thrift of one's energies is often more vital than the thrift of money." *Nolens volens*, energies have to be exercised in order to save expenditure where money is not available for it; and, moreover, the "shrewd" working woman will want to know why she should pay more for the heat from an electric fire and hotplate than she can get it for from the labour-saving gas fire and hotplate. Mrs. Partridge developed the thrift idea in this wise: "It was to this thrift of energy that electricity was going to help women, but electrical engineers needed the help of women in order to help all women to the thrift and gift of electricity, and this thrift of energy the Women's Electrical Association hoped to help the woman in the home to realize and achieve." Should this meet the eye of any working-class woman, we hope she will understand what the involved sentences imply. The programme of strategy mapped out for the Women's Electrical Association, we see, includes a summer school, arranged at a University centre, also co-operative purchasing privileges for members, the possibility of a loan fund upon which members could draw for electric wiring and equipment purposes, and finally the provision of an electrical house. The electrical ladies have evidently a lot to learn before they can teach others, and yet their faith is great and their vision large, though somewhat clouded.

Boiler House Coke-Handling Plant.

A net annual saving of over $5000 (after having extracted the operating and maintenance costs) is shown by Mr. J. J. Hartley, of the Link-Belt Company, in the pages of "Industrial and Engineering Chemistry," as having accrued to a prominent Chicago business firm through the adoption of coal-handling plant in the boiler house, to supersede manual labour. The system, which is a complete one, comprises a track hopper, conveyor, gravity discharge elevator, overhead bunker, and weigh lorry. Interest at 6 p.ct. and depreciation 5 p.ct. on the $20,000 spent upon the installation totals $2200 a year; and repairs, oil, attendance, &c., are put at another $200. On the other hand, the equipment has reduced the number of firemen necessary from six to one; and the elimination of five firemen at $1500 a year means lopping off the pay roll a total of $7500 annually. Furthermore, the coal can be dumped into the track hopper (from bottom dump cars) without the necessity of extra men from the plant; and this eliminates considerable labour and cost. Not only this, but the men in the plant did not like leaving their regular work to shovel coal for a half day, and the installation of the track hopper and conveyor has completely done away with the old grumbling and complaint on the part of these men. But considering only the major item of $7500 a year through the elimination of the five firemen, the net annual saving, as shown, is in excess of $5000.

NOTES ON THE WORKING OF THE GLOVER-WEST VERTICAL RETORTS AT FOLESHILL GAS-WORKS.

By CHARLES F. TOOBY, A.M.I.Mech.E., Works Manager, Coventry Gas Department.

[A Paper read before the Midland Association of Gas Engineers and Managers, Nov. 27.]

The results given in Table I. were obtained on an installation of nine settings of 8's, silica retorts 20 ft. long, by 2 ft. 9 in. by 10 in. at the top, tapering to 3 ft. 3 in. by 1 ft. 6½ in. at the bottom, rated to produce 2½ million c.ft. of straight coal gas per diem, with a coal throughput of 2½ tons per retort. Each setting has a separate waste-heat boiler of the water-tube type; and the whole of the steam so generated, except that used by the feed pumps, is supplied to the retorts. No steam is supplied to the retorts from external sources. During the period under review, the whole plant has been shut down on two occasions, as an experiment; and during holiday times some of the settings have had to stand off. Also, for about 24 hours every week-end, the amount of steam to the retorts has been reduced by approximately 25 p.ct.

It is useful to compare different carbonizing results on the basis of the net cost of the coal per therm in the gas. Chart No. 1 gives the net cost of coal per therm in gas, with coal at 30s. per ton, for the following cases:

Case A.

82 therms per ton.
14 gallons of tar per ton at 2½d. per gallon.
34 gallons of 10-oz. liquor per ton at ¾d. per gallon.
9·4 cwt. of coke per ton for sale.

Case B.

68 therms per ton.
10¾ gallons of tar per ton at 2½d. per gallon.
32 gallons of 10-oz. liquor per ton at ¾d. per gallon.
11·2 cwt. of coke per ton for sale.

The chart shows an economy in favour of Case A for all coke values up to about 31s.—a value for net coke receipts, with coal at 30s. per ton, which would be realized only in times abnormally favourable to the coke market. It shows also the rapidly increasing economy of steaming as the value of coke per ton decreases. The ratio which the net receipts for coke per ton of coke bear to the cost price of coal per ton is a vital factor governing the net cost per therm in the gas. In the case of some undertakings this ratio approaches unity, and in these instances the fact is usually reflected in the very low cost of production. In other examples the ratio falls as low as 0·6. At Coventry it is about 0·8. This ratio is one of the predominating factors which have to be considered when deciding between the adoption of a carbonizing system giving straight coal gas and a high yield of coke for sale, or a system by which a high yield of gaseous therms is accompanied by a low yield of coke for sale.

In the case of large extensions to the gas-making plant, when it is necessary to avoid glutting the coke market, there are, broadly

TABLE I.—*Working Results. Glover-West Vertical Retorts at Foleshill Gas-Works, Coventry Corporation.*

All weights are actual, as given by works' weighbridge; and the results given for yields are based on the gross weight of coal (uncorrected for moisture, &c.).

Gas samples for calorific value tests are collected in a 100 c.ft. holder. One sample is collected during the day period and one during the night. All tests are by Junkers' calorimeter.

The gas does not mix with the gas from the horizontal retorts until it has been measured through a separate wet-type station meter.

Period.	Gas Made, C.Ft. (Corrected).	Moist Coal Carbonized, Tons.	Gas Made C.Ft. (Corrected) per Ton of Moist Coal.	Calorific Value, B.Th.U. (Gross) per C.Ft.	Therms in Gas per Ton of Moist Coal.	Steam to Retorts, P.Ct. on Coal.	Average Number of Retorts Working.	Average Coal per Retort per Diem, Tons.	Nominal Rated Throughput per Retort per Diem on Straight Coal Gas.	Average Volume of Gas per Retort per Diem.	Nominal Rated Volume Output per Retort per Diem on Straight Coal Gas.	Coke, Breeze, and Dust for Sale per Ton of Coal.	Coals in Use (23 Different Varieties).	Average Temperature of Gas at Outlet of Collecting Mains.	Estimated Yields per Ton of Coal.	
															Tar, Gallons.	Gallons, 10 oz. Liquor
									Tons.	C.Ft.	C.Ft.	Cwt.	P.Ct.	° Fahr.		
Quarter ended—																
June 30, 1923	263,001,000	16,525	15,915	491	78	15	63·0	2·45	2·50	39,000	31,250	9·4	S. Yorks. 56		14	34
Sept. 30, 1923	235,274,000	13,421	17,530	474	83	20	65·3	2·23	2·50	39,100	31,250		N. Staffs. 20			
Dec. 31, 1923	256,687,000	14,195	18,083	462	84	20	69·1	2·25	2·50	40,400	31,250		Derbyshire 24	172		
Mar. 31, 1924	248,159,000	14,180	17,500	461	81	20	69·0	2·23	2·50	39,500	31,250					

It will be observed that during the last three quarters, when steaming to 20 p.ct., the throughput of coal was reduced by approximately 10 p.ct. only, and that the volume output per retort was increased by approximately 27 p.ct. compared with the nominal straight coal gas output. On the average, twenty different coals were carbonized each week, and frequently as many as ten different coals were elevated to the bunkers on the same day.

During the quarter ended March 31, 1924, owing to the strike of the railway companies' locomotive men, a considerably larger percentage of poor-quality Derbyshire coals, including some non-coking varieties, were used. The labour employed on the plant for carbonizing, including removal of coke to screening plant, attendance on waste-heat boilers, scurfing, oiling extractor gear, valves, &c., and flushing of mains, is as follows:

1 leading hand
2 top men
2 coke discharge men
1 fireman
¾ telpher driver
} per 8-hour shift.

1 labourer on days only, for oiling extractor gear, levers, &c., and an additional man as required for filling retorts after scurfing.

The wages for the whole of the work detailed above for the year, including also a proportionate charge for the wages of the works carbonizing foremen, who supervise also the horizontal retort section, amounted to 0·270d. per therm.

For the year ended March 31, 1923, when the horizontal retorts, operated by Fiddes-Aldridge simultaneous charging and discharging machines, were in full operation, the corresponding figure for horizontal gas was 0·452d. per therm; but in that year rates of wages were about 10 p.ct. higher than during the year ended March 31, 1924.

The following table shows that a substantial reduction in the cost of coal-gas therms into the holder has been effected by the operation of the vertical retorts.

TABLE II.—*Net Cost per Therm into Foleshill Holders, including Repair and Maintenance of Manufacturing Plant, General Upkeep of Works, and Manufacturing Salaries.*

Year 1922-23.		Year 1923-24.	
Coal Gas. Horizontal Gas.	Carburetted Water Gas.	Coal Gas. 54 P.Ct. Therms Vertical Gas. 46 P.Ct. Therms Horizontal Gas.	Carburetted Water Gas.
d. 3·44	d. 4·81	d. 2·89	d. 4·81

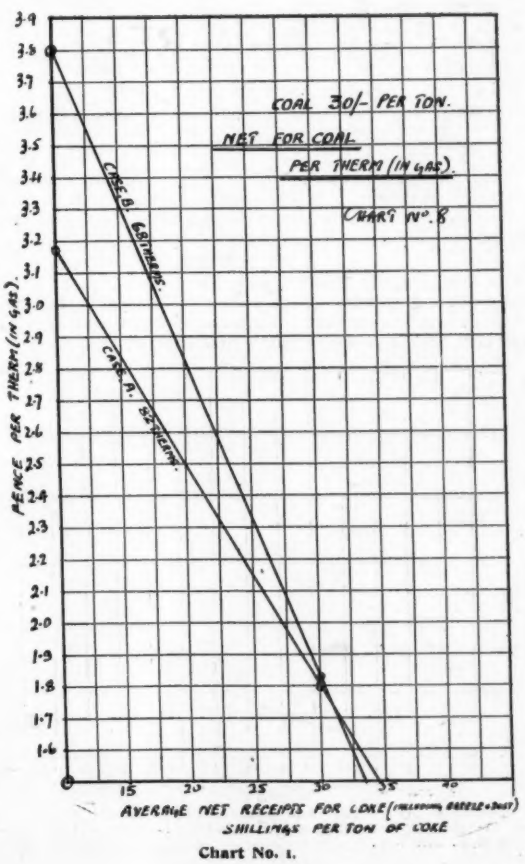

COAL 30/- PER TON.
NET FOR COAL
PER THERM (IN GAS).
CHART No. 1
CASE B. 68 THERMS
CASE A. 82 THERMS.
PENCE PER THERM (IN GAS).
AVERAGE NET RECEIPTS FOR COKE
SHILLINGS PER TON OF COKE

Chart No. 1.

speaking, two practical alternative systems open for consideration:

(1) Vertical retorts with steaming.
(2) Straight coal gas plant combined with carburetted water gas plant.

Carburetted water gas is slightly cheaper to produce per therm than blue water gas, even with oil prices at present figures, owing to the greatly increased therm output of the plant when using oil; but it is much more costly to produce than coal gas on a therm basis.

The vertical retorts at Foleshill have been in operation for twenty months only, so that it would be injudicious to dogmatize at this moment; but all indications point to the belief that they will produce therms at a lower cost than the combination of horizontal retorts and carburetted water gas plant, fulfilling at the same time one of the most useful functions of the latter plant—that of avoiding a glut on the coke market.

STEAM TO RETORTS.

Perfect control of the amount of steam passing to the retorts is essential for obtaining the best results; but in this respect the steaming arrangements at Foleshill have been a great handicap. In the early stages the waste-heat boilers primed badly, and large quantities of boiler sediment were carried forward into the steam lines, and gave endless trouble by blocking the ¾-in. steam valves and nipples. The priming difficulty has since been largely overcome, but the sediment previously deposited in the steam lines has continuously caused blockages of the supplies to different retorts; and, unfortunately, owing to the arrangement of the main valves, the clearing of the valve on any retort necessitated shutting-off the steam from one-half of the installation. The existing steam connections are now being replaced, after various experiments, by an arrangement which provides an isolating valve for every four retorts, in addition to a ½-in. fullway valve on each retort.

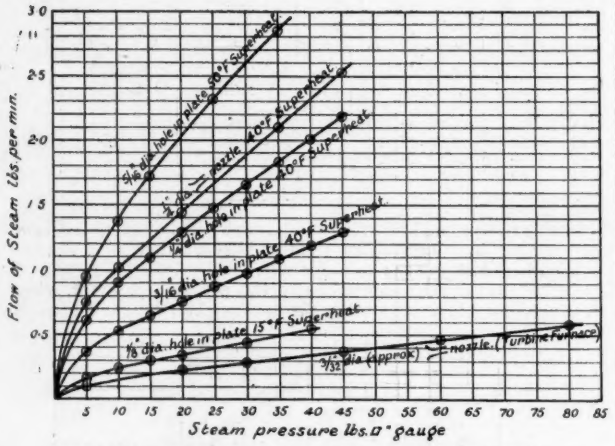

Flow of Steam lbs. per min.
Steam pressure lbs. "gauge
5/16" dia. hole in plate 30°F Superheat
½" dia. — nozzle 40°F Superheat
¼" dia. hole in plate 40°F Superheat
3/16" dia. hole in plate 40°F Superheat
⅛" dia. hole in plate 15°F Superheat
3/32" dia. (Approx.) — nozzle. (Turbine Furnace)

CHART No. 2.—Flow of Steam through cylindrical holes in plate ¼ in. thick, and through convergent parallel nozzles. Results of actual tests at Foleshill Gas Works, September, 1922.

Chart No. 2 may be useful in connection with steaming in Glover-West retorts. It was prepared from results obtained by condensing the steam in a special coil, and measuring the amount of resultant water.

CONDENSATION.

Gas engineers are familiar with the fact that there is a fundamental difference between the condensation of the gas from horizontal retorts and of that from steamed vertical retorts. It has been commented on by various writers, and was mentioned briefly by Mr. L. H. Thomas in his Presidential Address to the Midland Junior Gas Association last year (see "JOURNAL" for Oct. 24, 1923, p. 257).

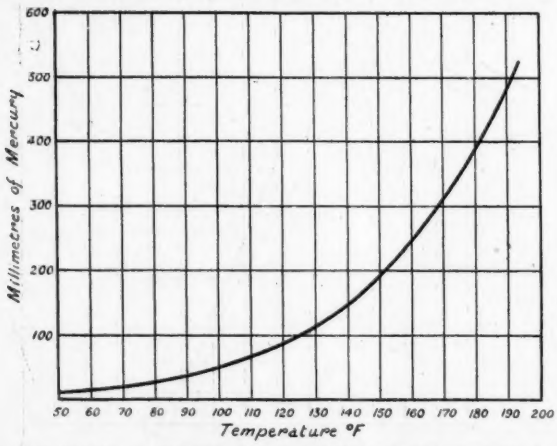


CHART No. 3.—Pressure of Aqueous Vapour (m/m. mercury at 0° C.) plotted from Regnault's Values. Normal Barometer = 760 m/m. mercury.

Table III. gives full details of a series of tests on condensation, made at the Foleshill Works; and charts Nos. 3, 4, 5, and 6 give fundamental data relating to condensation.

The heat which has to be removed from gas during cooling may be divided conveniently under two headings:

(*a*) The sensible heat of the gas and liquid condensates given up in cooling to the temperature at which each leaves the cooling system.
(*b*) The latent heat made sensible by the condensation of the vapours to liquid products.

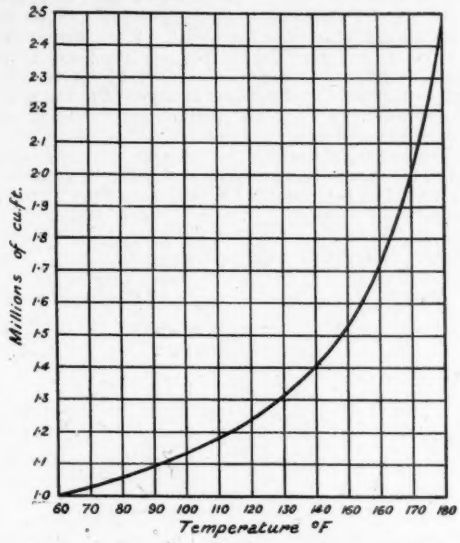


CHART No. 4.—Volume occupied by 1 million c.ft. (at 60° Fahr. and 30 in. mercury) of moist gas when saturated with water vapour at different temperatures. Pressure constant (30 in. mercury). Plotted from figures in "Gas Manufacture," by Dr. W. B. Davidson.

In the condensation of gas from horizontals and from steamed verticals, the quantity (*b*) is much greater than the quantity (*a*); and in the case of steamed verticals (*b*) becomes relatively very great.

From chart No. 6 the theoretical gallons of condensed water per million c.ft. of saturated gas for the appropriate gas temperature range in each test has been read, and placed in column (*f*) in the table of tests; and in column (*g*) the approximate latent heat made sensible by the condensation of this water is tabulated. This latter figure is based on the fact that the latent heat of water

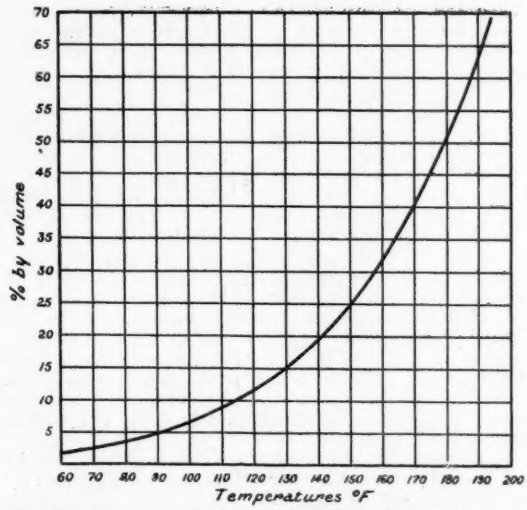


CHART No. 5.—Per Cent. by volume of water vapour in gas saturated at different temperatures (calculated from Regnault's Vapour Pressure Values). Barometer pressure constant 30 in. mercury.

vapour is approximately 1000 B.Th.U. per lb., or 10,000 B.Th.U. per gallon, of water.

The following equation gives the heat balance for the process of condensation in water-cooled condensers:

$$\left[\begin{array}{c}\text{Sensible heat given up by the gas and liquid condensates}\end{array}\right] + \left[\begin{array}{c}\text{Latent heat made sensible by condensation of vapours to liquids}\end{array}\right] = \left[\begin{array}{c}\text{Heat absorbed by the cooling water}\end{array}\right] + \left[\begin{array}{c}\text{Heat radiated to atmosphere}\end{array}\right]$$

Bearing in mind the fact that with a low air temperature, other

TABLE III.—*Tests on Water Cooled Condensers Working on Vertical Retort Gas at the Foleshill Gas-Works of the Coventry Corporation.*

Size of Condensers: There are two condensers, each having a gas chamber 6 ft. 2 in. by 6 ft. 6 in. by 21 ft., and each containing 400—1¼ in. outside diameter—wrought-iron water tubes, giving a tube surface exposed to the gas of 4200 sq. ft. in each condenser—a total of 8400 sq. ft. for the two condensers.

Method of Working: The gas first enters No. 1 condenser and passes through the two condensers in series. Cooling water from the canal first enters No. 2 condenser and passes in series through the two condensers—*i.e.*, in a direction opposite to that of the gas flow.

Note: During all tests given below, except No. 11, a constant supply of liquor was being admitted to all collecting and foul mains, which is the usual practice at Foleshill. Four hours before Test No. 11 was made all liquor supplies were stopped, except two small jets to the outlet of the retort house governors.

—	Test No.	Gas per Hour, C.Ft. Corrected.	Coal per Hour. Tons.	Gallons Cooling Water per Hour.	Temperatures, ° Fahr.								Air Temperature ° Fahr.	Millions of B.Th.U. Absorbed by the Water per Hour.			Millions of B.Th.U. Absorbed by the Water per million c.ft. of gas (60° Fahr. and 30 in.)	B.Th.U. Absorbed by the Water per sq. ft. of External Tube Surface per ° Fahr. Drop of Gas Temperature.	B.Th.U. Absorbed per Gallon of Water.	Velocity of Water. Ft. per Sec.	Actual Gallons of Condensation Obtained per Million C.Ft. (Corrected) of Gas.		Approx. Theoretical Gallons of Water Condensed per million c.ft. (Corr.) of Saturated Gas, Cooled through same temperature range (see Chart No. 5).	Approx. Latent Heat made Sensible by Condensation of Theoretical Quantities given in last column. Millions of B.Th.U.	Steam to Retorts. P.Ct. on Coal Carbonized.
					No. 1 Condenser. Gas.			No. 1 Condenser. Water.			No. 2 Condenser. Gas.			No. 1 Condenser.	No. 2 Condenser.	Total.					Liquor	Tar.			
					In.	Out.	Drop.	In.	Out.	Rise.	In.	Out.													
Dirty tubes	1	106,000	6·3	3740	156	122	34	71	103	32	122	84	52	1·20	0·56	1·76	16·6	2·91	470	0·029	..	..	1710	17·1	22
	2	106,000	6·3	3750	158	124	34	70	103	33	124	84	52	1·24	0·53	1·77	16·6	2·85	470	0·029	..	..	1850	18·5	22
	3	110,000	6·3	2440	153	125	28	75	113	38	125	82	43	0·93	0·60	1·53	13·9	2·57	625	0·019	..	..	1560	15·6	22
	4	105,000	6·3	3410	159	129	30	71	108	37	129	90	39	1·26	0·72	1·98	18·9	3·42	580	0·026	..	..	1855	18·6	22
	5	112,000	6·3	3410	155	125	30	68	103	35	125	86	39	1·19	0·68	1·87	16·7	3·23	550	0·026	..	..	1660	16·6	22
	6	114,000	6·3	2523	157	138	19	110	146	36	138	82	56	0·91	1·46	2·37	20·8	3·76	940	0·020	..	..	1810	18·1	22
	7	111,000	6·3	2600	158	136	22	103	147	44	136	76	60	1·14	1·35	2·49	22·4	3·62	960	0·020	..	..	1900	19·0	22
	8	111,000	6·3	2668	158	129	29	95	144	49	129	72	57	1·31	1·17	2·48	22·4	3·44	930	0·021	1780	180	1905	19·1	22
	9	113,000	6·3	2474	158	126	32	70	131	61	126	70	56	1·29	1·04	2·33	20·6	3·15	940	0·019	1690	167	1910	19·1	22
	10	118,000	6·3	3260	159	104½	54½	70	131	61	104½	62	55	1·99	0·57	2·56	21·7	3·14	785	0·025	..	..	2000	20·0	22
Clean tubes	11	109,000	6·3	2590	173	154	19	127	158	31	154	83	71	0·81	1·96	2·77	25·4	3·67	1065	0·020	2540	110	3405	34·1	22
	12	115,000	6·3	2575	158	117	41	81	139	58	117	62	55	1·49	0·80	2·29	19·9	2·84	890	0·020	..	..	1950	19·5	22
														(*a*)	(*b*)			(*c*)		(*f*)			(*g*)		

conditions being equal, more heat will be radiated to the atmosphere, leaving a smaller quantity to be absorbed by the cooling water, an examination of the results in the table, columns (*a*) and (*g*), will show how nearly the theoretical latent heat of the water vapour condensed from saturated gas approximates to the total heat absorbed by the cooling water.

During all tests except No. 11, a continuous flow of liquor was supplied to all collecting and foul mains. Four hours before test No. 11 was taken, the circulation of liquor was stopped. The temperature at the outlet of the condensers rose to 173° Fahr., but the test showed that at this temperature, under the given conditions, the gas was not fully saturated. The actual condensation of liquor measured during tests Nos. 8 and 9 shows on the average about 90 p.ct. saturation of the gas with water vapour. However, this is probably no definite proof that the gas was not fully saturated when it entered the condensers, owing to the possibility of particles of liquid water being entrained with the gas and carried past the condensers. Tests Nos. 1 to 5 were made after canal water had been in use for several months, and when, therefore, the tubes were coated with slimy matter. The remaining tests were carried out immediately after the whole of the tubes had been cleaned by wire brush. The increase in efficiency with clean tubes is clearly shown by the duty obtained per gallon of water—column (*c*).

Chart No. 7 is useful in explaining one reason for the variations of the results given in column (*b*). The tests with dirty tubes should be considered separately from the tests with clean tubes.

CHART No. 6.—Gallons of water per million c.ft. of gas (at 60° Fahr. and 30 in. mercury), deposited from gas saturated with water vapour at different temperatures, when cooled to 60° Fahr. (pressure constant 30 in. mercury). From figures given in "Gas Manufacture," by Dr. W. B. Davidson.

The following and other values can be deduced from chart No. 6.

Approximate Latent Heat made Sensible by the Condensation of the Water Vapour from 1 c.ft. (at 60° Fahr. and 30 in. mercury) of Gas Saturated with Water Vapour when cooled through different Temperature Ranges.

From ° Fahr.	To 60° Fahr.
	B.Th.U.
160°	21·2
158°	19·5
155°	17·6
150°	14·8
140°	10·5
130°	7·4
120°	5·2

In horizontal retort practice the temperature at the inlet of the condensers is usually about 130° Fahr.; and with liquor seals in the hydraulic mains, the gas is probably very nearly saturated with water vapour at that temperature. At Foleshill, with steamed verticals, the corresponding temperature with continuous liquor circulation in the mains is about 158° Fahr.; and the gas is nearly saturated at that temperature. It is apparent from the preceding table that 19·5/7·4 = 2·6 times (approximately) the amount of latent heat from condensation of water vapour has to be dealt with in the condensation of vertical gas compared

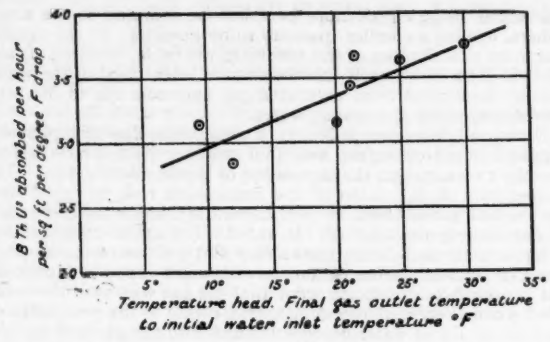


CHART No. 7.—Tests on Water Tube Condensers (clean tubes).

with that in the case of horizontal gas. This ratio would be nearly the same for the total heat to be dealt with in the two cases, since the latent heat constitutes such a large proportion of the total heat.

In conclusion, I wish to thank my Chief, Mr. P. N. Langford, the Engineer and General Manager of the Coventry Gas Department, not only for permission to publish the results given, but also for his valuable advice during the preparation of this paper. The very keen interest which he has taken in all the work leading up to the paper has been most encouraging.

Discussion.

Mr. F. C. BRIGGS (Dudley) remarked that the paper was a very good one, and almost beyond criticism without study. Apparently there had been some difficulty in connection with the waste-heat boilers at Coventry, and it might be that when the plant was being re-arranged some different type would be put in. At his works they had waste-heat boilers of a slightly different pattern, and they were supplying the whole of the power to drive the machinery for the plant, providing steam for the retorts up to 22 p.ct., and furnishing a certain amount of surplus steam for the works themselves. No difficulty had been experienced from priming. They were horizontal tube boilers, and the whole of the water arrangements were automatic, and quite simple. He did think there was some advantage in having more than one boiler. In his own case there were two, and when one had to be cleaned there was still one at work. If there was only one large boiler, and it had to be put out of action for cleaning, a serious position arose. The author said that carburetted water gas was slightly cheaper to produce per therm than blue water gas, even with oil prices at present figures, but that it was much more costly to produce than coal gas on a therm basis. He (Mr. Briggs) thought that most of them had now shut-down their carburetted water gas plant for this reason. Mr. Tooby referred to a continuous flow of liquor being supplied to all collecting and foul mains. Was this with the intention of keeping them clear of deposits, and was it found to be necessary? In his case he simply flushed out once a day with liquor, and occasionally—say, once a week—left the liquor valve open, and let the virgin liquor flush through the whole of the 24 hours.

Mr. E. D. WOOTTEN (Malvern) inquired whether the cause of the priming of the boilers had been determined, and what was the nature of the means by which it had been largely overcome. With reference to the continuous flow of liquor supplied to collecting and foul mains, he would like to know whether this circulating of the liquor increased the temperature in the storage well, and if so to what extent.

Mr. H. BANKS (Northampton) was also anxious to know how the priming difficulty alluded to by the author was overcome.

WOODALL-DUCKHAM RETORTS AT BIRMINGHAM.

Mr. G. C. PEARSON (Birmingham) said the point which struck him about the matter was that vertical retorts appeared to give pretty well equal results whatever system might be used. The author was fortunate in that he had had experience of both Woodall-Duckham and Glover-West retorts. For the last fifteen years he (the speaker) had been connected with Woodall-Duckham retorts, and he thought that the results which could be obtained with them were approximately similar to those which Mr. Tooby had given. When considering results at the present time, they must, of course, remember that the general introduction of steaming had altogether altered the outlook of gas making with vertical retorts. It had meant attaining higher temperatures, and this had called for a change in construction, and the introduction of silica material. There was no doubt that the whole system of steaming vertical retorts was even now in a state of transition. The original Woodall-Duckham retorts, in his opinion, would not, on low-grade gas, be anything like equal in results to Glover-West retorts, because they had not high bottom heats. But in their latest construction the Woodall-Duckham Company had introduced a secondary combustion chamber several feet below the proper combustion chamber, and they were able to control the heat at the bottom of the retorts, and bring the temperature up. By this means the cracking of the steam had been wonderfully improved. Judging from the working in Birmingham, he thought they could even beat the excellent results secured at Coventry. One point mentioned by Mr. Tooby was that the whole of the steam from the waste-heat boilers was utilized for steaming the retorts. Did this mean that waste-heat boilers installed with the Glover-West system were inefficient, because they were able with the waste-heat boilers on their Woodall-Duckham retorts, not only to provide steam for the retorts, but to have a considerable surplus available for other purposes? In fact, at Windsor Street they practically speaking ran the works on the waste-heat boiler steam. Mr. Tooby seemed to experience a big reduction in coke yield with steaming; he gave a very substantial difference in yield from horizontal and vertical retorts. The method at Birmingham of calculating fuel was to take the total yield of coke, deduct the sales, and call the remainder fuel. The total figure of the coke was given to the laboratory, and over twelve months' they could get down to fuel 12 p.ct., which gave a much higher coke yield than Mr. Tooby's.

MR. LANGFORD'S TESTIMONY.

Mr. P. N. LANGFORD (Coventry) wished to voice his full agreement with the opinion that had been expressed by other speakers, that it was a most excellent paper, and one which would repay study in the future. The results were of interest because they were taken over a lengthy period, and embraced the stoppages at week-ends, when they had to reduce steaming considerably to equalize the stocks, and also to keep the calorific power constant, in view of the shutting-down of the horizontals for one shift on Sunday. Reference had been made by Mr. Pearson to the waste-heat boilers, and he would like to say with regard to these that, at the time when the question was gone into of installing them, the makers had nothing to offer other than a boiler for each setting, and they were certainly inefficient. The water evaporated worked out at only 1½ gallons per pound of fuel to the producers; and he could quite conceive that, in any extension they might make, these boilers might be scrapped, and a boiler installed in their place, such as was available now, which would take the waste gases collected from a number of settings. Then he hoped they would have a big surplus of steam for other uses on the works. One of the most interesting charts in the paper was the "Net for Coal." The author had devoted considerable time and thought to the subject of the relative values of various carbonizing systems. In December, 1919, Mr. Tooby contributed, under the *nom de plume* of "Works Manager," two articles to the "GAS JOURNAL," on the subject of the "Net Cost of Coal for Various Systems of Gasification," in which he set forth his facts in graphic form. These articles were very useful in helping one to arrive at the economic merits of different systems. Again, the information available in regard to condensation had been very fragmentary, and the research work Mr. Tooby had done in this matter would be most useful to gas engineers when the question of condensation arose in connection with vertical retort steaming. He was glad that the author had come forward and put his facts before them.

Mr. T. H. POULSON (Stafford) agreed that the waste-heat boilers installed at Coventry were really too small for the work. There was not sufficient steaming capacity for the heat admitted to be transmitted to the water. He was installing a horizontal boiler which would replace two existing waste-heat boilers, one of a capacity of 500 lbs. per hour, and the other 800 lbs. The new one would have a capacity of 4000 lbs. per hour, and would take the waste gases from two settings of the reconstructed type. The reconstruction merely meant carrying the retorts 4 or 5 ft. higher, and having a bigger producer; and the advantages over the smaller type of setting were really wonderful. To-day he was getting 500,000 c.ft. in 24 hours, instead of 300,000 c.ft. The coke consumption for the latter was 50 cwt. a day; at the present time, with the altered settings and bigger output, it was 70 cwt. So they were getting a larger output of gas for less coke consumption. They were hoping, with the larger boiler, to be in a position to shut-down their Lancashire boilers altogether; and in order to obviate any difficulty which might arise in the event of a tube bursting in the bigger boiler, they had put down a gas-fired boiler for supplying steam to the exhausters. This was large enough for the exhausters and feed pumps, so that they would be quite safe.

Mr. C. F. W. RENDLE (Redditch) also testified to the value of the two articles, written under the *nom de plume* of "Works Manager," to which Mr. Langford had referred. They seemed to put in a nutshell the cases for the two principal systems of carbonization. He congratulated the author on bringing again into publicity the excellent graph, which was a first-rate medium for comparison.

Mr. GEORGE HELPS (Nuneaton) desired to say, not only how much he appreciated the paper, but, further, how much he had appreciated for many years his association with Mr. Tooby and the work which that gentleman was doing for the industry.

Mr. F. SHEWRING (Stratford-on-Avon) inquired whether the author could subdivide the figures of net costs for coal gas 2·89d. per therm and for carburetted water gas 4·81d. per therm. It would be interesting if he could tell them what the carbonizing costs were in each case, and what were the works maintenance costs.

The CHAIRMAN (Mr. W. E. Caton, of Oxford) referring to the same figures (Table II.), pointed out that the author gave the net cost into the holders per therm of horizontal retort gas in 1922-23 as 3·44d.—including repair and maintenance of manufacturing plant, general upkeep of works, and manufacturing salaries. In 1923-24, including the same items, the net cost into holders of coal gas (54 p.ct. of the therms vertical gas, and 46 p.ct. of the therms horizontal gas) was 2·89d. per therm. Was anything allowed for repairs and maintenance of the vertical retort installation in arriving at the latter figure? The retorts had been in use only twenty months, and one would naturally suppose there would be nothing under that head.

Mr. T. F. E. RHEAD (Birmingham) said he appreciated the large amount of detailed work behind the tables. Referring to the one dealing with the working results of the Glover-West vertical retorts at Foleshill, he would be glad to have an analysis of the gas. Mr. Tooby, on increasing from 15 to 20 p.ct. steam, dropped his throughput about 10 p.ct. Had he tried 25 p.ct. steam and higher? Could he give the tar for the separate quarters, instead of just the average for the year?

REPLY BY THE AUTHOR.

Mr. TOOBY, in the course of his reply to the remarks made in the discussion, said, with regard to liquor circulation in the collecting and foul mains, he considered a continuous circulation of fresh liquor was best, because it effected a considerable cooling of the gas, with the consequent deposition of some of the tar in the mains, which effectually prevented the formation of pitch. This circulation naturally caused an increase in the temperature of the liquor; the temperature in the main storage well being about 130° Fahr. The priming of the boiler was lessened considerably by slightly reducing the degree of soft-

ness of the water, and by lowering the working water-level. In order to lessen the trouble caused when priming did take place, two-catch vessels, each made up of a 16 ft. length of 8 in. diameter steel pipe, placed vertically, were connected to the two main steam outlets of the boiler. These were fitted with sludge-cocks and steam traps, and served to trap any sudden rush of water. The temperature of the hottest heating chamber averaged from 1300° C. to 1325° C. He was interested to learn from Mr. Pearson that Woodall-Duckham retorts were now being built so that high temperatures could be maintained at the bottom of the retort, for steaming purposes, and felt certain that high bottom heats were conducive to the best results when steaming. He wished to emphasize the fact that the results given in the paper were working results, and included the period of the original starting-up. The coke yields were obtained by actually weighing all the coke for sale. They were limited in the amount of steam which they could put into the retorts by the output of the waste-heat boilers, which was rather low; but by reducing the coal throughput slightly, they were able to obtain considerably higher yields of therms in the gas per ton of coal than those given.

Some of the items in the cost of coal gas for the year ended March, 1924, per 1000 c.ft. of 500 B.Th.U. gas were as follows:

	d.
Wages	2·06
Purifying	0·27
Maintenance and repairs, and general upkeep	3·96
Salaries	0·35

The cost of carburetted water gas for the year ended March, 1923, per 1000 c.ft. of 389 B.Th.U. gas was as follows:

	d.
Oil	4·93
Fuel to generators	7·12
Fuel to boilers	1·24
Wages	1·80
Purifying	0·29
Repairs, maintenance, and general upkeep	2·55
Salaries	0·43
	18·36
Less residuum	0·05
= 4·81d. per therm.	18·31d.

The cost of coal gas for the year ended March, 1924, included, of course, the cost of repairs and maintenance of machinery, &c., on the verticals, but did not include any re-setting of the verticals, because none had been done. It did include, however, very heavy repairs to the horizontal retorts, because it was not possible, until the verticals were put to work, to carry out normal repairs. An analysis of the gas when steaming to 456 B.Th.U. was as follows:

CO_2	4·5 p.ct.
HC	2·0 ,,
O_2	0·5 ,,
CO	13·0 ,,
CH_4	21·1 ,,
H_2	48·5 ,,
N_2	10·4 ,,

INAUGURATION OF A NEW GASHOLDER AT SOUTHEND.

A Landmark in the Progress of the Southend and District Gas Company.

On Tuesday, Nov. 25, the new gasholder, built by Messrs. Cutler and Sons, Ltd., of Millwall and Westminster, for the Southend and District Gas Company was officially inaugurated. Mr. J. H. BURROWS, J.P., Chairman of the Directors, was in charge of the proceedings, and was accompanied by his co-Directors, the Engineer and Manager (Mr. Thomas F. Canning), and the Secretary (Mr. James T. Randall). Mr. Samuel Cutler and Mr. E. E. Cutler represented the Contractors.

The proceedings commenced with a luncheon to the Chairman and Directors of the Gas Company, after which an inspection was made of the new gasholder, and the ceremony of inauguration took place.

Mr. BURROWS congratulated Southend upon its growth as testified by the need for such a large holder, and the Company upon their realization of that need. He also wished to congratulate the Engineer upon the conception and carrying-out of the work, and the contractors and the workmen who had brought the scheme to completion. Within the next ten years they might look to a County Borough of a quarter-of-a-million inhabitants; and the Company would do their best to cope with the growing need.

Mr. CANNING explained the capacity and construction of the holder, in which, he said, there were 700,000 rivets, each driven into position by pneumatic machines. The tank was 182 ft. 6 in. in diameter and 28 ft. 10 in. deep. If they walked round the platform on the lower part, they would find that it was one-eighth of a mile. The capacity was 2½ million c.ft., which, with the old holder of 1 million c.ft. capacity, was only enough to supply Southend alone on its maximum day. With the other holders, however, they had an ample reserve storage.

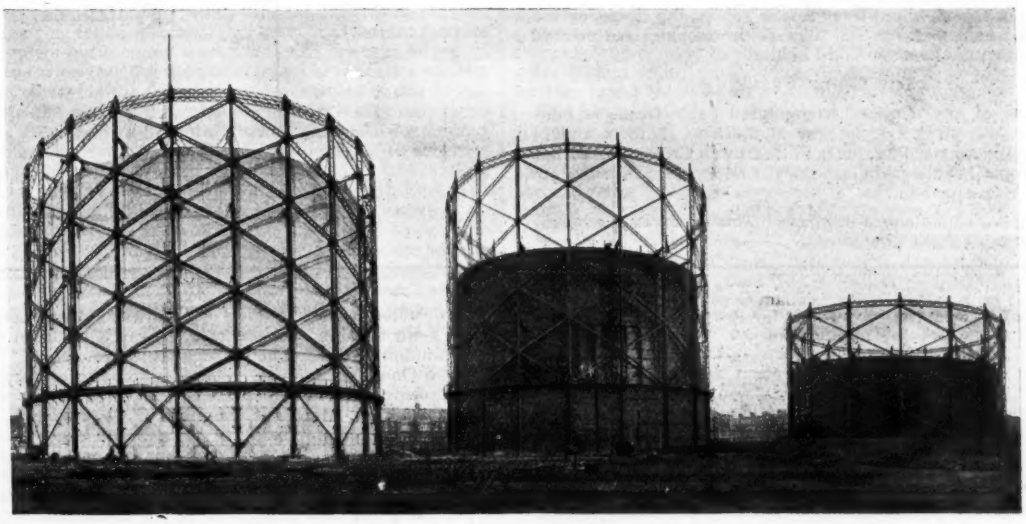
Mr. SAMUEL CUTLER was pleased to see that the holder erected was of exactly the same design as the others in the yard. This indicated that the work done for the Company had given them every satisfaction. The Chairman had said that in ten years' time Southend would have a quarter-of-a-million inhabitants; and he hoped that soon they would require another holder of the same type. He begged that the credit for successful work should be given to the Engineer and the men, because it was only by the co-operation of everyone associated that a job of this description could be made a success.

Captain WOOSNAM, the Deputy-Chairman, then called upon Mrs. J. H. BURROWS to turn on the gas to the town.

Later six hundred and thirty officials and employees sat down to tea in the ballroom of the Kursaal—Mr. BURROWS presiding.

Mr. S. CUTLER proposed "Success to the Southend-on-Sea and District Gas Company." There was no such thing, he said, as standing still in business. One must always be advancing to succeed or falling back to fail. The Company was an example of progress. He had had the opportunity of knowing it for a good many years. He could not claim to go so far back as the date of its incorporation in 1854, but he could claim that within the past two, or even three, decades it had been most interesting to him to watch the steady progress of the Southend undertaking. Naturally associated with the Company as he had been on behalf of his firm, which had an interest in nearly every gas undertaking in the country, he had had special opportunities of judging the organization and administration. As concerned their Board of Directors, composed as it was of business men and men of affairs in all branches of commerce and profession, such a Board was rightly constituted. He had had the privilege of knowing the officials intimately. Mr. Canning, the Engineer, was a gentleman for whom he had great regard, and who was recognized as a first-class engineer; and their able and energetic Secretary, Mr. Randall, did his duties in the very best manner. Last, but by no means least, they had a loyal staff.

The CHAIRMAN, responding for the Company, remarked upon the change which had come upon the Company during the last four years. To-day he could truly address most of the gathering by the term "fellow shareholders." The principle of co-partnership was still something of an experiment as far as the nation was concerned; but a day was coming, in his judgment, when men would receive in addition to



Erected 1924. Erected 1898. Erected 1892.

THE GASHOLDERS AT SOUTHEND.

their wages a share of the profits, and by their manual work help the organizers of labour to transact their engagements. After giving a word of praise to the Contractors and the Engineer and officers, the Chairman said the Company came into existence in the year 1854.

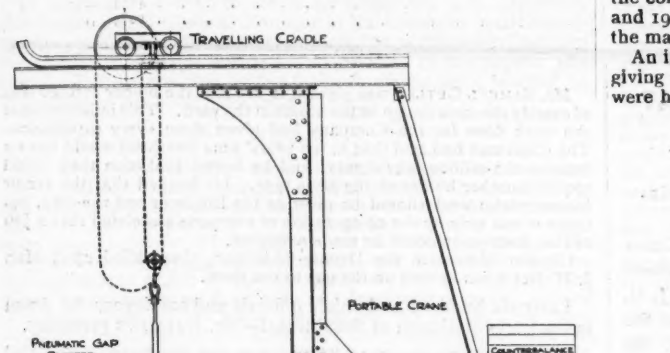
Mr. S. CUTLER asked Mrs. Burrows to accept a silver cake dish to mark the inauguration.

Mrs. BURROWS thanked them for the gift. She hoped that the future would hold success for them all.

DESCRIPTION OF THE HOLDER.

The holder is in four lifts, contained in a steel tank 182 ft. 6 in. in diameter by 28 ft. 10 in. deep; its capacity being 2,500,000 c.ft. The guide framing has been constructed on the "Cutler" triangulated system, and the completed structure, as shown in the accompanying illustration, has a pleasing and well-proportioned appearance.

The tank contains 21,000 tons of water. The bottom and first row of tank sides were erected upon timber stools of sufficient height to allow access between the underside of the tank and the foundation. After completion of the riveting and caulking, this portion of the tank was flooded with water, and all seams and rivets tested, after which it was lowered by a series of jacks on to the permanent foundation.



Riveting Tank Bottom.

The lower strakes of the tank sides are jointed with double-butt covers and 12 rows of rivets. The efficiency of these joints is 90 p.ct. of the plate strength.

PNEUMATIC RIVETING OF TANK.

The riveting and caulking of the tank were carried out by powerful machines operated by compressed air. The plant used comprised a 42-B.H.P. oil engine driving a compressor which delivers air up to 100 lbs. per sq. in. pressure to a steel receiver, and thence to the armoured distributing hoses. The riveting machines have a 6-ft. gap and an arrangement of pistons and toggles by means of which a steady closing pressure of up to 100 tons can be brought to bear upon each rivet.

The height from ground-level to the top of the dome of the fully-inflated holder is 140 ft. The guide framing was erected from the crown of the air-inflated holder.

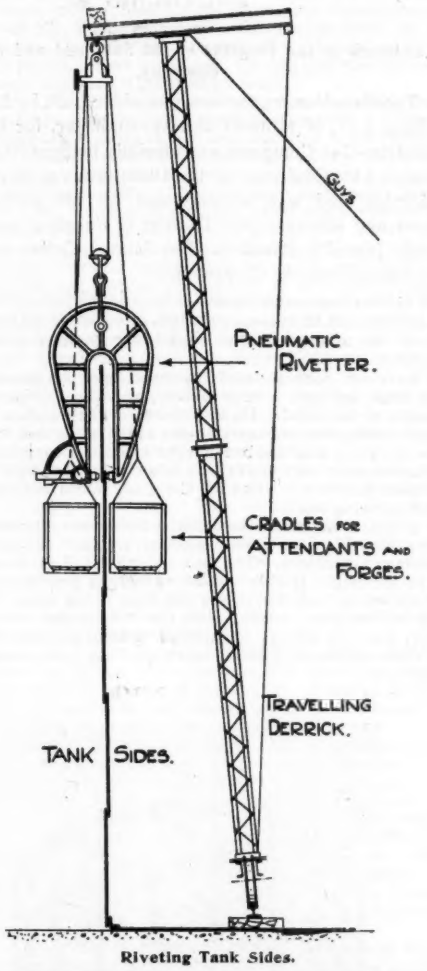
THE GUIDE FRAME.

Every part of the "Cutler" triangulated guide frame is built to function as a strut. It is thus unalterable in form and of great strength and stability. Mr. F. Southwell Cripps, the author of "The Guide-Framing of Gasholders," summarized its characteristics as follows:

1. It possesses no redundant members. This conduces to economy without sacrificing strength.
2. It provides a very rigid and self-supporting guide frame for the gasholder bell to work up and down in freely. No unusual strain is brought to bear upon the bell. Nothing is expected of it beyond holding, storing, and delivering the gas; the transverse and distorting strains being entirely taken-up and resisted by the guide framing.
3. Owing to the broad strut action at the base of each upright, there is but little strain on the foundation bolts. Consequently less holding-down is required, and economy is effected in building the tank.
4. The horizontal stiffness of the guide-framing cylinder, due to the wide girder-like struts and the box girder at the top, admits of making the standards or uprights much lighter than is usually the case, without impairing the strength of the structure as a whole.
5. The struts not only have the advantage of giving enormous stiffness and rigidity to the structure, but they, in common with the rest of the guide framing, are easily handled and erected, thus effecting economy in time and cost.

Incidentally it might be mentioned that this is the third gasholder which Messrs. Cutler have erected for the Southend Gas Company, all three being constructed with the "Cutler" system of triangulated guide frame. These three holders are shown in the composite illustration, being erected respectively in 1892, 1898, and 1924, and form a good example of continuity of design and the maintenance of the contractor's reputation.

An interesting little booklet was prepared by the contractors giving a detailed description of the new holder, and copies of this were handed to the Company.



Riveting Tank Sides.

Illuminating Engineering Society.—A meeting of the Society will be held at the Lighting Service Bureau, No. 15 Savoy Street, Strand, W.C. 2, at seven o'clock on Tuesday, Dec. 16, when further particulars and demonstrations of recent advances in electric lamps and lighting appliances will be given.

Mr. Shewring's Midland Association Paper.—In the fifth line from the end of Mr. Shewring's reply to the discussion on his paper at the recent meeting of the Midland Association of Gas Engineers and Managers, on p. 656 of the "JOURNAL," the word "pressure" has inadvertently been substituted for "temperature." The sentences should have read: "Speaking personally, he did not favour pressure in the settings. He found that when they had such pressure, there was a lower *temperature* at the top of the retorts, and the results were not so good."

A Combine to Abolish Dirt.—The brush industry and the gas industry are fighting, each in its own way, a common enemy of the community—dirt. The current issue (No. 129) of "A Thousand-and-One Uses for Gas" contains some interesting illustrations showing many of the processes involved in the production of brushes of all kinds. It describes the sterilization, washing, and drying of hair, the fixing of bristles and other materials in the heads or stocks, the drying of enamel on the brush heads and handles, the drying of tooth brushes after sterilization, and so forth. It then shows how gas is the ideal and economical fuel for providing the heat and power required for these operations. Copies of this publication can be obtained, free of charge, on application to the Secretary of the British Commercial Gas Association, No. 28, Grosvenor Gardens, S.W. 1.

COMMERCIALIZING THE DISTRIBUTION DEPARTMENT IN THE SERVICE OF THE PUBLIC.

By W. J. SANDEMAN, of Croydon.

[A Paper read before the Southern Association of Gas Engineers and Managers, Nov. 25.]

Though the primary function of this Association is the dissemination of personal experiences relating to the technical aspects of gas manufacture and distribution, I make no apology for addressing members upon a purely commercial topic, because I am sure they will agree with me that, unless technical procedure is correlated with sound commercial administration, the highest degree of efficiency in engineering practice will not alone serve to win popular approval for the undertaking.

A good deal was said regarding the importance of goodwill during the Departmental Sessions at the International Advertising Convention. To quote but one case: In the Department of Public Utilities Advertising, Mr. Boys, in a most able paper, expressed the view that "the most wonderful thing and the greatest possible asset which a public utility can enjoy is to have an understanding and a favourable public opinion." Those of us committed with the responsibility of business development wholeheartedly share these sentiments and those of Mr. Samuel Insull, of the Commonwealth Edison Company of Chicago, which are given to us in the following words:

> Take the public into your confidence, not as a favour to them, but as their right. We are getting our income from the communities. We are depending upon them for success, and therefore the wise thing for us to do, from the point of view of the narrowest self-interest, is to take them into our confidence and treat them with absolute fairness. It matters not how much capital you may have, how fair the rates may be, how favourable may be the conditions of service; if you haven't behind you a sympathetic public opinion, you are bound to fail.

Each year the gas industry becomes less of a monopoly and more of a competitive business; and hence it is becoming increasingly dependent upon sympathetic public support for its commercial existence—*i.e.*, for the payment of dividends and for the raising of adequate capital for necessary extensions.

Now what influences public opinion? Unquestionably, nature of policy and quality of service. These two factors, which manifest themselves in the working of an undertaking, form customer-opinion, and that opinion may be good or bad, just as the policy is popular or unpopular, and the service efficient or inefficient. It is in regard to policy, therefore, that we should first direct attention to this matter of securing goodwill. At times I feel that our policy is fundamentally wrong in this respect. We are still too governmental in our methods, and insufficiently business-like; and I think it will do our business an incalculable amount of good if we make up our minds carefully to review our general attitude towards our customers by placing ourselves in their position.

There is a familiar couplet from the pen of Robert Burns which runs as follows:

> "O wad some power the giftie gie us
> To see oursels as others see us!"

Is there not a wealth of meaning in these lines in relation to the topic we are discussing?

There still seems to be a leaning towards arbitrary rules and regulations stereotyped by statutory powers and interpreted with the mailed fist rather than with the velvet glove. These are, doubtless, the remnants of a now obsolete autocratic policy—a policy based upon one's unassailable position consequent upon monopoly powers. But to-day we have essentially to be human. I am not suggesting for one moment that we should assume the rôle of philanthropist; but in many ways I do think it would be profitable for us to review this question of conduct towards consumers. There is no gainsaying the fact that what is needed to-day in our relations with the public is a spirit of less formality and more friendliness; less dignity and more pleasantness; less dogma and more reasoning; less indifference and more concern. In short, as one gentleman very frankly said at the Advertising Convention, "we need to come down from our pedestal and be really human;" and, I would add, to minister to the needs of our customers as we ourselves would like to be ministered to. This is the basic spirit which must govern our policy if we are seeking to secure permanent and profitable patronage, which business success many of us are daily learning is an absolute function of customer-opinion. This was the great lesson to be learned from the International Advertising Convention. But I cannot further discuss policy. It is a matter for independent consideration, and one cannot go into details on the point. Of this I feel sure—it does us all good periodically to review our policy, ever bearing in mind the fact that we are in business to serve the public; and in this capacity it must be our object to serve it better.

A final word in connection with policy. In these days it would seem that some people are apt to associate popular policy with copious free work. Nothing, to my mind, is more erroneous. The policy of a gas supply undertaking may be broadly defined as the encouragement of the use of gas; and the extent to which gas is used is directly related to its price. For this reason I am strongly of the opinion that each section of the undertaking's work should be made as self-supporting as possible, and that gas should not be called upon to bear the burden of free-work policy. My own view is that people do not appreciate that which costs them nothing; and I question very much the financial soundness of free fixing and kindred work, involving the outlay of a good deal of money in providing means for consuming gas which are very seldom used, but which have been put in because it cost the person nothing to have them installed! In my opinion, people are willing to pay a fair price for what they require. They want, like all of us, value for their money; and it is the work of national and local publicity to make people really want to use more gas. But the more you advertise—indeed, before you start to do so—the more must you equip yourself efficiently to carry out the service you are advertising; and this is where the distribution department comes into its own.

This brings me to the second component which forms customer-opinion—quality of service; and in this connection I would again urge upon everyone the importance of a properly-equipped distribution department. We are becoming increasingly dependent upon a higher degree of efficiency in this department, for it is the channel through which the policy of the undertaking is made known personally to the customers of that undertaking. In the past, service has stood for little. To-day its significance is becoming more and more appreciated, and the rendering of more efficient service is now, I believe, receiving attention throughout our industry.

For years the only work, as I remember it some 25 years ago, of the distribution department was the laying of mains and services, the fixing of meters and clearing of services, and attention to complaints—and this at the convenience of the undertaking! But times have altered in so far as the scope of this department is concerned; and in the average undertaking this section now carries the added responsibility of popularizing the use of gas, being vested with its scientific utilization *via* the discreet recommendation and proper installation of appliances. It is well this change has come about; it indicates a broader outlook—the desire to sell and the desire to serve. But the whole point is this: Are the means and material adequate? Is the department equipped properly to carry this extra load? This is a point I think we should do well to consider; for obviously these modern phases of a distribution department's work render the department increasingly commercial in its operation, and call for a revision of methods and personnel. So far as methods are concerned, this subject was dealt with by me at some length in a paper entitled "The Organization and Administration of a Distribution and Sales Department," which I had the privilege of presenting to this Association on Nov. 29, 1921. [See "JOURNAL" for Dec. 7, 1921, p. 687.] I made the point that it paid to invest in proper up-to-date organization, bearing in mind the present-day extensive functions of a distribution department. But the time at my disposal did not then permit me to say very much about the personal equation; and it is upon this latter point that I wish specifically to dwell this afternoon. I may, by the way, remind you that the paper was criticized on the point of cost; and it was suggested that, though the procedure as outlined might be afforded and could be justified in a large undertaking, it could not be entertained from the cost point of view in smaller concerns. I am not seeking to be controversial on this point; but during the three years that have elapsed since the presentation of this paper, I have become more convinced than ever that money spent in properly equipping a distribution department is a financial investment of the soundest order, because if your service is below par, your goodwill is at a discount. It may be argued that this question of goodwill is being overdone, seeing that gas is an absolute domestic necessity and that, since people cannot do without it, business is accordingly assured. That there is some truth in this is evidenced by the fact that some gas undertakings get business in spite of themselves. But this day is passing, and passing quickly. There is an important commercial difference between a man coming to you because he wants something and you going to him with an offer of service; and it is in this latter connection that I think we have much leeway to make up.

The impression we should try to create is that we have something good to sell, and that we are doing our utmost to sell it in the best interests of the public. It is this thought in relation to the staffing of a distribution department to which I want particularly to refer. In what directions is service-man-power needed? I think we may summarize our requirements as follows:

1.—In directing ability—*i.e.*, commercial management.
2.—In advisory ability—*i.e.*, telling the consumer how best his wants can be catered for. Very often consumers have no conception as to what they want. They need assistance; and it is the duty of the undertaking to provide skilled advice.
3.—In fitting supervisory ability. It is useless having a staff available to recommend the use of appliances unless there are trained practical men available who can supervise the installation of these appliances on proper workmanlike lines.
4.—In fitting ability. We need highly-skilled, trained fitters.

I need hardly remind you that lack of factor No. 1 (commercial management) means absence of inter-departmental co-ordination, with its attendant waste of money and irregularity of procedure, the irritations of which latter failing have to be suffered by the public. The importance of fully-trained salesmen, inspectors, and

foreman-fitters is, I think, apparent to all. What is more damaging to any undertaking's reputation than clumsy fitting work? I have called attention to this fact before, and have myself seen gasfitting work done in such a rough and ready way as to give one the opinion that anything does for gas, and that it is a decaying industry. Not only does such work injure the particular concern responsible for it, but its effect reacts throughout the country and damages the whole industry. We must cultivate a high degree of finish in our fitting work. The finished job stands more or less as a permanent record of service. For example, what sort of impression is created by an installation of an oxidized-silver bracket, fitted with polished brass pneumatic valve and fittings? This is just one case I have recently encountered, and it is typical of what I call lack of intelligent fitting supervision. Installation work and complaints must be attended to intelligently and promptly. Prompt service and the fulfilment of promises are great factors in winning popular approval.

An adequate and competent distribution staff should be available; and this leads me to the very important question of training the personnel of a distribution department. The compulsory course of training which all lads entering the service of my Company have to undergo covers a period of four years, during which time tuition is given to them at the local Polytechnic in the following subjects, by special arrangement with the Education Authority:

First Year Students.

One evening per week—Mathematics (practical): one hour.
Geometrical Drawing: one hour.

One evening per week—General Science (demonstrated lectures): two hours.

Second Year Students.

One evening per week—Theory and Practice of Gas Supply: one hour.
General Science (continued): one hour.

One evening per week—Carpentry (practical): two hours.

Third Year Students.

As for Second Year Students—Intermediate Courses.

Fourth Year Students.

As for Second Year Students—Advanced Courses.

During the third and fourth years special experimental science classes are available for the intermediate and advanced students, who may attend, if they so desire, at the Company's expense, to further their knowledge.

From the fitter springs the foreman and (occasionally) the inspector. Then we have to consider the salesman, the indoor showroom assistant, and the outdoor representative. For some time, most of us, I think, have been in the habit of taking fitting apprentices and giving them some sort of training. The extent to which our lads are educated, apart from their practical training with the tools, has been referred to above; but little has hitherto been done in the direction of training salesmen. I am therefore considering the question of taking salesmen apprentices; and if possible I hope to give them an opportunity to become acquainted with the practical side of the work. It is also my intention to arrange matters so that the fitting apprentices have an opportunity to become familiar with the indoor selling organization and clerical routine. In this way we shall get understanding men—men with more intelligence, men with more discrimination, consequent upon a broader outlook on the affairs of the undertaking; and I think the effect of these more highly educated men, acting, as they will, in the capacity of personal representatives of the concern, will do much to foster goodwill and ensure understanding customers.

Employment in a public-utility undertaking has many inspiring features, and particularly so in a service capacity. In the case of our own utility, the men at the works end of the organization may be justly proud of their attainments in the economical manufacture of gas of constant quality and purity; but to the distribution staff is reserved the privilege of coming into personal touch with the concern's customers. The privilege carries with it an important responsibility, as by their attitude and personal efficiency, in whatsoever capacity they may severally make contact with the public, the distribution employees do much either to make or to mar the fortunes of the undertaking.

Let us then see to it that we do justice to ourselves and to our customers in this essential matter of properly manning the distribution department.

Discussion.

The PRESIDENT (Mr. L. J. Langford, of Tunbridge Wells) said they wanted members like Mr. Sandeman to come forward and "ginger them up." A study of his paper must lead them to the opinion that it was necessary for undertakings to consider the training of their men, in order to give this special service to consumers. They would always have to face competition, and the introduction of the practices which the author recommended would aid in the securing of what they were all looking forward to—a satisfactory service for every gas consumer in the country.

Mr. FRANK LIVESEY (Maidstone) congratulated his old friend on his paper, which was full of valuable matter and "pep." One could see that he was a successful salesman. Speaking personally, he was a firm believer in the policy of simple hire. The amount of money received for the hire of apparatus should balance the cost of maintenance. Since the war the balance in his case had been upset, and now they were faced with an expenditure of probably 1d. per therm to make good the deficit. If a gas undertaking had a piece of apparatus on hire, and the slightest thing went wrong with it, the consumer would send to the office at once; if it was not on hire, and the consumer had to pay for the necessary repair, he would not send to the gas undertaking. They might shortly be up against the question of universal inspection of fittings, and this summer he had carried out a special inspection of geysers. There was nothing to find fault with in any on hire, but two not fixed by the Company were discovered without flues. They said to the consumer: "This is dangerous, you must have it put right; and the cost will be so much." Would the consumer have it put right? No. With regard to free service, he did not believe in the free fixing of apparatus which might not be used, but the obligation of the keeping of which in safe condition the undertaking had to shoulder.

Mr. P. E. BROWNE (Brighton) remarked that the paper contained golden truths which must be circulated throughout the industry, if it was to prosper. In one place the author had said: "There still seems to be a leaning towards arbitrary rules and regulations stereotyped by statutory powers, and interpreted with the mailed fist rather than with the velvet glove." His (the speaker's) reply to this was: "Thank God for the statutory powers; they are very useful things to have about the house." They did not need to use the mailed fist, but they did want a little restriction in the matter of what a consumer might demand, and as to how far they must go in trying to meet that consumer, because some people were rather unreasonable. Of course, if they wished to extend their business, they must go out of their way to meet their customers as far as might be, but there were limits beyond which they must not go; and though statutory rules and regulations should not be brought into use indiscriminately, they should be thankful to have them as guiding principles.

THE POLICY OF FREE FIXING.

He endorsed every word that had been said about the policy of free fixing. He represented a gas company within 50 miles of London; and the wonderful tales he was told about the free work that was done throughout London, and also in the Provinces, were really very difficult to combat. In Brighton before the war they used to fix cooking stoves free up to 30 ft. run, and fires free up to 20 ft., and to extend mains and lay services without any let or hindrance. They altered this policy, however, during the war, and made people pay for their requirements—for running the whole of the distance of supplies to cookers and fires, and for fixing—and they had continued this policy since. It had had no detrimental effect on their business. They found they were able to give away a lot before the war, and it was not appreciated. To-day they were employing somewhere in the region of 60 to 70 p.ct. more fitters than pre-war, and their trouble was in getting the work done—not in looking for it. So he thought they might take it that free work did not pay. It had, of course, to go on the price of gas. The same remark applied to services. He thought the responsibility for services should be limited to the boundary line of the premises. The modern tendency was to put up a bungalow about 100 ft. from the road. Who was to bear the expense of laying a service of this character? If it was the company, the consumer would be for ever a charge on the undertaking.

A UNIVERSAL SERVICE DEPARTMENT.

He was quite in agreement with Mr. Sandeman as to the desirability of, and necessity for, careful staffing of the distribution department, both in the direction and execution of the work; and it might be of interest to state in this connection that in Brighton they had initiated a scheme which had a dual purpose—viz., (1) the education of the fitters' mates, who would, it was hoped, ultimately become the fitters of the Company, and (2) service to the customers by the supervision and maintenance of all gas-consuming appliances on the district, whether of Company or private ownership, making no charge for labour—the materials only being charged for, and then only, of course, on privately-owned apparatus. He referred to the Universal Service Department; and though it was too early yet to state very much about results (the scheme was only launched on March 1 of this year), some brief particulars might be of service. In the first place, the Company arranged for all their boys to attend gas-fitting classes at the local Municipal Technical School, as part of the terms of engagement; and as far as the Universal Service Department was concerned, specially selected lads of not less than two years' training were chosen to undergo a special course of training, lasting three months, in the burner maintenance, brass-fitting, cooker, and fire shops, followed by an examination (practical and written). The first batch of twelve lads was put on to the district on March 1, the territory being mapped out into areas and placed in charge of the District Maintenance Foremen, originally the Maintenance Inspectors. By gradual development, the department was now 46 strong, and so far as they were yet able to form conclusions the scheme would justify its cost (estimated to become ultimately 0·2d. to 0·25d. per therm sold), in retaining the great middle-class custom for gas lighting, into which the electricity suppliers were hitherto making extensive inroads, the result, in the Gas Company's opinion, of improper supervision of appliances. Though chiefly concerned with gas lighting burners, the staff attended to cooking stoves and fires as regarded re-fuelling, replacement of small parts, &c., though, of course, special appliances and hot water apparatus needed skilled attention in their own branch, and had been, and would continue to be, treated by specially trained fitters; while the work of remedying complaints of supply received other than from this universal house-to-house visiting was in the hands of a staff of 20 skilled fitters, the Universal Service Department only acting as an auxiliary. So far 12,000 customers had been visited, and it was thought that ultimately a staff of 70 to 80 would be needed for the scheme. This, however, could only be determined when it was decided how many visits per house per annum would be necessary.

Mr. C. F. BOTLEY (Hastings) endorsed what had been said about the uselessness of free work, which was not appreciated. It placed a burden upon the gas consumer indirectly, and not in proper proportion.

Mr. STEPHEN LACEY (Gas Light and Coke Company) regarded the paper as a statement of policy with which they were all in agreement.

The enormous amount of apparatus being put out on the district, rendered the whole problem more and more complex. He much sympathized with the point of view that it was very desirable to keep apparatus under the control of the gas undertaking.

REPLY OF THE AUTHOR.

Mr. SANDEMAN, in reply, said he agreed with Mr. Livesey as to simple hire, and at Croydon they hired-out cookers, fires, and circulating boilers. But one curious fact noticeable in the last few years was that, though they hired-out these appliances, their sales order were 50 p.ct. above their hire orders. The public were prepared now to pay for these things. His Company had an enormous instalment purchase system, and they did not lose touch with these appliances. They had a card-index for each consumer, and put down on that all the appliances the consumer had. They tried to get every appliance on their maintenance system. They did not have any free system, except for gas-fires, and there they made no distinction, whether it was the Company's fire or the consumer's fire. They did not charge for materials in connection with gas-fire maintenance, and they had men on this work all the year round. This was the only thing they gave away in regard to maintenance. He quite agreed that statutory powers were useful, but he did think that gas undertakings were rather too apt to rely upon them. This was the point he wanted to make. He was interested to hear Mr. Browne say his Company looked after all appliances on the district.

USE OF LIVE STEAM IN PURIFICATION.

By F. J. PEARCE, of the North Middlesex Gas Company.

[A Paper read before the Southern Association of Gas Engineers and Managers, Nov. 25.]

In dealing with this subject, I feel some apology is due to those members of the Eastern Section of this Association who were present at the monthly meeting in the early part of this year at which the question of the use of steam in purification was brought up, and concerning which an interesting discussion took place. When your President asked me at very short notice if I would contribute a paper for this meeting, this subject suggested itself to me; and as purification is a matter of vital importance, I venture to bring it forward this afternoon, and therefore ask the indulgence of those members who were present at the former meeting. As the time at my disposal was so short, these remarks are merely intended as the opening of what it is hoped may prove to be a useful discussion.

I should like to make it quite clear at the commencement that I lay no claim whatever to be the originator of the use of live steam in this connection. The credit for this belongs, as far as I am aware, to Mr. Godwin, Engineer to the Watford Gas Company, who has been using this system for the last eight or nine years with great success. At Mill Hill it was adopted at the beginning of November, 1923, and continued up to the end of last July. From then to the middle of October, steaming was stopped, as no difficulty was encountered during the summer with purification; but it has now been resumed again.

The causes which led to the adoption of this system in November last arose with a series of sharp and sudden frosts which brought about considerable increases in consumption and necessitated a large increase in the quantity of carburetted water gas made, to such an extent that it was only with great difficulty that I was able to purify the gas properly, especially as the temperature of the boxes dropped to a point at which the oxide appeared inactive. Matters were not at all improved by changing boxes and putting-in fresh oxide, as this oxide, having been lying out in the frost and wet, was in no better condition as regards chemical activity. In fact, it was noticed that the oxide taken out was apparently in as good condition as that being put in, if not better, and I quickly came to the conclusion that the only thing to do was to raise the temperature of the boxes by some artificial means. Knowing that Mr. Godwin had been using steam for this purpose for some years, I decided to do likewise, and made a ½-in. steam connection into the pipe supplying air for revivification to the inlet of the boxes. It took about eight hours steaming before any results became apparent; and it was then found on testing that, instead of one clean tap on each section, there were two clean boxes on each section—the foul gas entering the first box at 85 to 90° Fahr.

The carburetted water gas purifiers at Mill Hill consist of two sets of three boxes, each 20 ft. by 20 ft.; the stream of gas being divided, and half going through each in a downward direction. The steam and air together enter the inlet main at a point about 150 ft. away from where the gas actually enters the first box; the air being supplied by a small rotary blower driven by the washer-scrubber engine, which is fairly near both coal gas and water gas purifiers. The same machine supplies air to both sets of boxes; the supply to each set being carefully controlled by a cock on each branch of the pipe. The speed of the engine is kept regular by means of a Harding's counter, which is read hourly.

The point at which the steam is admitted is of great importance, as its function is to raise the temperature of the gas before it enters the boxes, and it is absolutely necessary that all moisture, except that amount which the gas is capable of carrying at the inlet temperature, shall be condensed and deposited in the inlet syphon—otherwise the oxide in the first box will quickly become sodden and unfit for purification. Up to the present, I am happy to say, I have not experienced the slightest trouble with sloppy oxide, or with back pressure from this or any other cause connected with steaming. By increasing the inlet temperature of the gas still further to 120° Fahr. better results were obtained; it being found that most of the H_2S present was being removed in the first box, as the following table will show:

	Section A.		Section B.	
—	P.Ct. of Total H_2S Removed.	Temp.	P.Ct. of Total H_2S Removed.	Temp.
No. 1	79·55	98° Fahr.	59·09	118° Fahr.
No. 2	14·77	,,	38·63	112° ,,
No. 3	5·68	50° ,,	2·28	105° ,,
	100·00		100·00	

Possibly some comment may be made with regard to the difference in temperatures of sections A and B. I would like to point out that section A is in the open air, and the thermometers are placed in the sides of the boxes, protruding into the oxide, so that they do not give the actual temperature of the gas entering the box; while section B is in a building, and the thermometers are in the covers immediately over the inlet pipe in each case, so that the temperature is the actual temperature of the inlet gas.

Prior to the use of steam for raising the temperature, it was found that during the periods of low atmospheric temperature, the amount of the total H_2S removed in the first box of the series rarely exceeded 30 p.ct.

The quantity of air admitted to the boxes is not measured, but is carefully regulated, so that the amount of oxygen in the purified gas does not exceed 0·2 p.ct., this figure being obtained daily from tests upon a 12-hour sample of gas. It is not possible to take long samples of the foul gas; but spot tests show that the amount of oxygen present here rarely exceeds 0·6 p.ct.; the difference (0·4 p.ct.) being taken up in the boxes. This was the usual practice before steaming was commenced, and it was not found necessary to alter it.

The average total inerts in the purified carburetted water gas at present is:

	P.Ct.
CO_2	4·2
O_2	0·2
N_2	4·7
Total	9·1

These figures prove conclusively, I think, that the good results obtained were not due to the use of extravagant quantities of air, but entirely to the high temperature produced by the use of steam, causing the oxide to become more active.

Having met with such a measure of success on the carburetted water gas purifiers, the same system was adopted on the coal gas section; the steam being introduced in a precisely similar manner. Here the boxes are of ample size for dealing with the make of gas, but it was felt that, even so, the increased working temperature would avoid the necessity of changing so frequently; and this has proved to be the case.

The coal gas purifiers consist of a set of four 30 ft. by 40 ft. boxes worked in rotation; the gas passing in a downward direction. Steam was introduced into the main on the outlet of the washer-scrubber in sufficient quantity to raise the temperature of the inlet gas to 120° to 130° Fahr.; the condensate being collected in a syphon immediately on the inlet to the boxes. During the period of maximum make in January last, the following results were obtained:

—	P.Ct. Total H_2S Removed.	Inlet Temperature of Gas.
No. 1	57·2	131° Fahr.
No. 2	21·4	119° ,,
No. 3	14·3	94° ,,
No. 4	7·1	64° ,,

Here, as on the carburetted water gas section, it was generally found that from 30 to 35 p.ct. was the usual quantity of the total H_2S to be removed in the first box, without the use of steam. The air to these boxes is regulated in exactly the same manner as described previously; but a trace of ammonia is allowed to go forward from the washer-scrubber in this case, as a further aid to purification.

The general result obtained by raising the temperature of purification in the manner described has undoubtedly been the lengthening of the life of the boxes, thereby reducing the heavy cost of changing the purifiers. It is a difficult matter to arrive at comparative figures in the case of the water gas boxes, as conditions vary considerably, owing to fluctuations in the quantity of gas made, quantity of oil used, &c.; but with the coal gas boxes the saving is most marked.

During the year 1923, six of the coal gas boxes were emptied and refilled; the quantity of gas purified by each box amounting to 42,611,000 c.ft. During the present year up to the end of October, only four boxes have been emptied and refilled; the quantity of gas purified by each box amounting to 57,280,000 c.ft. —equivalent to an increase of 34 to 35 p.ct.

It should also be noted that the same oxide was used in 1924

as in 1923, and would therefore contain a much higher percentage of sulphur, which would, in ordinary circumstances, call for more frequent changes. With regard to the amount of sulphur present in the oxide after each fouling, I am unable to give any figures of my own, as no new oxide has been put into use recently; but Mr. Godwin has furnished me with the following figures:

1st change	. . . . .	27 p.ct. sulphur
2nd ,,	. . . . .	39 ,, ,,
3rd ,,	. . . . .	46 ,, ,,
4th ,,	. . . . .	51 ,, ,,

The oxide generally contains 10 to 15 p.ct. of moisture after revivification, and is found to work well with this moisture content. The oxide, when being removed from a foul box, is generally fairly dry and hard, but of perfect porosity; and in no single case has there been any tendency to fire. As a matter of fact, there was a much greater tendency to fire before the use of steam was adopted.

In the early part of this year the tops of both sets of carburetted water gas boxes were lagged to prevent the chilling of the gas, due to atmospheric conditions acting through the thin sheet-steel covers. As soon as this was done, it was noticed the temperature of the boxes evened up; there being only 13° Fahr. between the inlet temperature of the first box and the third box, as given in the table under section B. With the coal gas boxes, which are not lagged, the temperature difference between the inlet to No. 1 and No. 4 amounts to no less than 67° Fahr. It was also found that appreciably less steam was required to maintain the same inlet temperature. The material used was hair-felt, ½ in. thick, stitched on to lengths of canvas, and laid across the top of the boxes. Those outside were afterwards covered with Ruberoid roofing material, to render the hair-felt impervious to the weather.

In conclusion, I would like to draw your attention to two or three possible objections to the system which has just been described. First of all, the large quantity of condensate to be pumped from the inlet syphon may, in some cases, constitute a nuisance; but unless the conditions are exceptional, the advantages gained far outweigh the disadvantage from this source. Secondly, if naphthalene is present in the gas, and the oxide becomes charged with it, the raising of the temperature is likely to cause this to go forward and become deposited elsewhere. Thirdly, if the purifiers are in close proximity to the meters, with the gas leaving the boxes at a fairly high temperature, it is almost impossible to avoid the temperature at which the gas is measured mounting up considerably and making a fairly heavy correction necessary on the quantity of gas made.

Discussion.

The President (Mr. L. J. Langford, of Tunbridge Wells) remarked that although this subject had been discussed by the Eastern Section earlier in the year, Mr. Pearce had presented a statement which was well worthy of further discussion now. He had shown them what he had done by the use of steam in purification.

Mr. C. Chambers (Harrow) asked whether the author had noticed any increase in the naphthalene content of his gas. His own view was that it was increased by the use of steam.

Mr. C. F. Botley (Hastings) said the paper drew attention to many useful points in regard to purification. He supposed they were all agreed that with oxide of iron purification a certain temperature was necessary for chemical activity; but though the author might be said to have proved his case in his own particular circumstances, he (Mr. Botley) felt that to use steam in this particular way was perhaps going rather out of one's way to achieve a certain object. He remembered from experiments carried out many years ago that the use of steam by direct application to the gas stream did bring about many difficulties. Mr. Chambers had already referred to one. It followed almost necessarily, if they had naphthalene anywhere near the purification plant, that it must go forward to the district; but really the greatest difficulty which led to its abandonment, as he remembered the experiments, was the excessive amount of moisture in the oxide, which got into a sloppy condition, and upset the process of purification. The author, however, had appreciated this point, and had obviated the trouble by condensing-out the moisture before it became a nuisance to the purifiers. But one had to dispose of this condensate, and it must be very objectionable to get rid of in some cases. The aim could surely be achieved without putting steam direct into the gas.

A Steam Coil Preferable?

He had recently had to consider the case of purifiers placed in a very exposed position, where the fall in the temperature was so great that the chemical activity was directly interfered with; and he gave careful consideration to the points raised in the discussion by the Eastern Section, and to the experiences at Watford, to see whether the difficulty with which he was himself faced could be solved in this way. The conclusion he came to was that it was not advisable for him to adopt this method, and he had overcome his trouble by putting a steam heating coil in the top of the purifiers. He did not wish to say too much about his experiences with this particular plan. Of course, "nothing was new under the sun," and he expected it had been adopted by other members present; but it did, with a very small amount of steam, achieve the desired end, which was to raise the temperature so far as was necessary to secure the degree of chemical activity essential for purification. If they had boxes with water lutes, there need not be the same difficulty in keeping up the temperature, as steam could be injected into the lutes. Another point the author called attention to was the lagging of the boxes. He (Mr. Botley) had lagged the sides, but had never yet lagged the top. It did, however, strike him as being a very useful suggestion, and he thought possibly that the success of purification to the degree indicated in this paper was not dependent upon the use of steam in order to raise the temperature. In their diverse operations, they could often pursue the wrong hare.

Mr. Percy S. Hoyte (Plymouth) inquired of the author whether he did not think he could have achieved the same result—he was referring to carburetted water gas—by working the outlet of his condensers at a somewhat higher temperature. In this way he would secure the increased temperature necessary for maintaining the oxide in an active condition. Of course, they might get a certain amount of oil carried forward to the purifiers; but at Plymouth they had, at the inlet to the purifiers, a Livesey washer, and here they caught practically every trace of oil. No difficulty whatever was experienced in keeping the oxide active—somewhere in the neighbourhood of 85° to 90°. A different condition, of course, arose when it came to coal gas purification; but in the case of carburetted water gas at any rate it did seem to him that by working the outlet of the condenser at a somewhat higher temperature than usual exactly the same result might be attained.

Mr. W. H. Warren (Gas Light and Coke Company) said he had experienced similar difficulties in cold weather, and steam was added at the inlet main to the purifiers. The condensed water was drawn away from the syphon in the ordinary manner. The steam worked like a charm, and the vessels almost immediately became active. The cold weather continued, and in a day or two the boxes became as bad as they had been before, although the temperature was still high. The weather then got warmer, the steam was shut off, and the vessels again became active for about a month. After this they were troubled with an epidemic of pressure, and the vessels had to be cleaned out. It was then discovered that the material had been sloppy, and had subsequently become consolidated. He could not understand why this had not happened in Mr. Pearce's case.

Mr. W. S. Venner (Brentwood) informed the members that he had purifiers in a very exposed position, and had experienced all the troubles to which reference had been made. They now had coils at the bottom of the boxes, and worked their oxide up to 45 or 50 p.ct., with very little steam. They had hardly any difficulty with the boxes.

Mr. J. Wesley Whimster (Bath) said he had used steam in both carburetted water gas and coal gas purifiers, and had not found the oxide get wet. With reference to water gas, he did not quite agree, for two reasons, with the suggestion made by Mr. Hoyte that the temperature of the gas at the outlet of the condenser should be raised. The first reason was the oil going forward, though this could, of course, be stopped by the interposition of a washer. The second reason was more important—namely, that the temperature of the gas at the exhausters would be increased. But in these days, with so much waste heat about gas-works, why could they not have a heat interchanger, so that the gas as made would heat the gas after leaving the exhausters, and before going to the purifiers?

Mr. E. P. Vince (Minehead) sent the following written contribution to the discussion: The paper appeals to me. Our purifiers are very much on the small size; but through studying the paper, and applying the principles there laid down, I have succeeded in raising the throughput of gas per purifier from an average of 6,000,000 c.ft. to: First change, 18,075,000 c.ft.; second change, 16,270,300 c.ft. And there has not been a single instance of back pressure. We can only work upward flow, and the rotation system is inadvisable, owing to the small size of two of the purifiers. Their dimensions are: First box, 15 ft. by 15 ft. by 5 ft.; second and third boxes, 10 ft. by 10 ft. by 4 ft. 6 in. The make of gas for 1924 will probably be 49 to 50 million c.ft.

Questions Answered.

Mr. Pearce, in replying to the various speakers, pointed out that he had referred to naphthalene as a possible disadvantage of this system, and during the steaming last winter they certainly did get naphthalene deposited ahead of the boxes; but up to the present this season there had been no sign of it. With reference to moisture in the oxide, it occurred to him that possibly this was influenced to some extent by whether one worked upwards or downwards. In fact, he thought this had a very great deal to do with the matter. Formerly they had a steam coil at Mill Hill, but they took it out for the reason that it dried the oxide, and rendered it liable to fire when the boxes were opened. His boxes were dry-luted, so they could not inject steam into the lutes. The reason for lagging the tops of the boxes was that the gas going in at the top came into intimate contact with the thin sheet-steel covering. Now they were using half the steam that was required before, and the lagging had paid for itself. As to allowing the gas to leave the condensers at a higher temperature, they found this would not do at all. They had "P. & A." extractors, and directly the temperature of the gas was allowed to go up, tarry vapours slipped by and became deposited in the boxes, with the result that there was soon a heavy pressure. Mr. Warren, he was afraid, had had a very unfortunate experience with regard to the use of steam; but unless there were peculiar circumstances at his works which were responsible for this, it was difficult to see why things should have been so. His own experience had been exactly the reverse, and the adoption of live steam for this purpose had helped him out of a very serious difficulty. Mention had been made by Mr. Venner of a coil at the bottom of the box for heating the gas. As he had already said, he found a coil dried the oxide too much, and so rendered it liable to fire. He was glad to note that he had someone to back him up with reference to the oxide not becoming wet when a proper amount of steam was admitted. In the coal gas purifiers especially the oxide had a tendency to cake, but it was always porous, and they did not get any back-pressure. Therefore he did not think the point counted for very much.

Midland Junior Gas Association.—At a meeting next Friday evening (Dec. 12), in the Council House, Birmingham, Mr. B. F. Botwood, of the Birmingham Corporation Distribution Department, will read a paper on "Arterial Supplies," with special reference to electrolysis. For the following afternoon (the 13th inst.) a visit has been arranged to the works in Manchester Street, Oldbury, of the Midland Tar Distillers, Ltd.

LONDON AND SOUTHERN DISTRICT JUNIOR GAS ASSOCIATION.

A Meeting of the Association was held at the Westminster Technical Institute on Friday, Nov. 28.

Mr. W. NEWTON BOOTH, who presided, said that they were privileged to have with them Dr. Harold Hartley, Chief Chemist to Messrs. Radiation Limited, who would give a lecture on gas cooking. Dr. Hartley needed no introduction; and they all looked forward with pleasure to what he had to tell them.

Dr. HARTLEY, who was cordially received, then proceeded to deliver a lecture on

GAS COOKING.

The lecturer opened by saying that for a proper understanding of the principles underlying cooker design, it would be necessary first to consider the nature of foodstuffs, which could generally be divided into two classes—animal and vegetable. It was proved by analysis that most foodstuffs contained a large proportion of water; and this was a very important factor, because, in the process of cooking, the water content of foods was largely reduced.

Vegetable foods are distinguished from meats by their high carbohydrate content relative to the other nutrients in them. The carbohydrate is stored in the plant system as starch, and circulates as sugar. Vegetables differ markedly in structure from meats, as in the case of vegetation the nutritive portion is contained in cells, the casing of which is cellulose—an insoluble substance which it is difficult to digest. It was pointed out that whereas meat-foods form a compact food, demanding only a chemical digestion, vegetable matter in general makes a bulky article of diet. Vegetables constitute our main source of mineral salts, and are an important source of vitamines.

The pulses were dealt with separately. They are distinguished among vegetables by their high nitrogen content, the greater part of which is in protein form. They are also well supplied with carbohydrates, but are poor in fats. They have a high nutritive value. Prior to cooking they require to be soaked in water for a considerable time. Hard water for this purpose should be avoided, because the protein legumen which they contain forms an insoluble compound with such water. Some pulses take up as much as 80 p.ct. of water on soaking.

It was pointed out that cooking does not increase the digestibility of meat-foods, though it does increase that quality in vegetable foods. Cooked animal foods are less digestible than in the raw state. The general effect of cooking on meat is to loosen the fibres by the gelatinization of connective tissues, and to eliminate some fat, and results in a decrease in the water content with a corresponding increase in the nutritive value. Generally speaking, raw meat loses some 20 p.ct. on cooking. In the case of vegetables, the water content increases from 4 to 15 p.ct. by cooking. The increase in bulk, coupled with the high indigestible content, considerably dilutes their nutritive element; so that for adequate feeding considerable strain must be thrown on the stomach.

Reference was made to some experiments which the lecturer had carried out ten years ago when comparing internally and externally heated ovens. It was emphasized that a great deal of nonsense has been talked in connection with the net loss in weight (mainly water) occasioned by the use of this or that type of oven. The lecturer's experience in this connection is that the design of the oven has but little effect, providing it is capable of giving the temperature conditions required for proper cooking. In the case of the two gas-heated ovens to which reference has been made, no evidence was obtained to intimate that the amount of loss was in any way affected by the design of the oven.

The proteins in meat, when heated to 180° Fahr., are coagulated. This temperature is important. It is undesirable that they should be heated to a higher temperature, as excessive cooking only results in the toughening of this coagulated mass. Like those in meat, the proteins of vegetables coagulate and contract on heating, tending to cause thereby a closing-in of the cellulose walls. This would inhibit digestion; but owing to the fact that the cell walls are in the main ruptured during the cooking process by the starch, which is rendered soluble, the gain in digestive properties due to this, together with the initial low protein content, leaves the balance considerably in favour of increased digestibility for vegetables as a result of cooking.

Fats are not much affected, though at higher temperatures partial decomposition, resulting in the production of a fatty acid, may occur. It is thus desirable that overheating shall be avoided in the cooking process. Particular attention has been paid to this point in the "New World" cooker.

The carbohydrates starch and sugar are much affected by the action of heat. Dry heat converts starch into dextrin—a change which occurs to some extent in the crust of bread and in the making of toast. Moist heat causes a swelling of starch grains and allows of gelatinization. This swelling enables them to rupture the cellulose envelopes in which they are contained in the vegetable foods. It is for this reason that the boiling of vegetable foods increases their digestibility. Cane sugar melts at 320° Fahr.; at about 390° Fahr. it loses water and is gradually changed into caramel. The formation of caramel often plays an important part in the development of flavouring and cooking, and its formation appears to be important in the production of a well-browned loaf. Osmazone is the name given to the very savoury substance produced on roasting meat, due to the effect of heat on the extractives. It is a dark-brown sticky substance, and is found on the surface of a properly-roasted joint. The formation of osmazone from extractives is somewhat similar to that of caramel from sugar.

Loss of weight assumed a mistaken importance in comparison between cooking by gas and by electricity; sometimes to the disadvantage of the first-named. A series of tests which had recently been made proved that there was no difference in the weight lost in actual cooking of a similar joint in a gas and in an electric oven; and further, it made no difference to the net loss of weight when the test was in an externally heated oven. Dr. Hartley pointed out the importance, from the point of view of thermal efficiency, of the hotplate of the gas-cooker. It has been proved that the new type of hotplate shows a saving of 33 p.ct. in gas consumption. The hotplate burners must be sufficiently powerful to allow of quick boiling of large pans; they must be capable of rapid adjustment to allow of simmering; and it is important that provision should be made to permit a reduction of consumption which will allow of maintenance at a temperature of 180° Fahr. for stewing, for the preparation of sauces, &c. These conditions must be attained in such a way that the maximum thermal efficiency results—a point of special importance on the hotplate in view of the amount of gas used there. The burners are adjusted to enable half-a-gallon of water to be boiled in from ten to twelve minutes. All are provided with taps to permit of easy adjustment to a cut-down position suitable for simmering, and each hotplate has at least one duplex burner provided with a further device to permit of attaining a stewing consumption. The provision of these devices is one of the most important features from the domestic standpoint, enabling easy attainment of the heat transference conditions required for the cooking, without accidental extinction of the burners.

Tests showed that 24 c.ft. of gas was required with the old type ring burner and wrought-iron bar to do the same work as was now done with 16 c.ft. Dr. Hartley mentioned the disadvantage of the old-type burner with drilled holes, which became choked-up by food boiling-over on to them, and thus reducing the efficiency, causing incomplete combustion, and the production of odours. These new burners were so designed that food boiling-over could not affect the flame orifices in any way; and thereby the efficiency of the burner remained constant under all general cooking operations. Proper space was left round the burners for efficient burning of the gas, and the flames did not impinge on the bars. He said that the average maid did not bother to regulate the gas supply by turning the tap; she generally pulled the pan to one side, so that less of the flame was allowed to reach it. To prevent this wastage, the new burners were provided with cut-down taps, which, when turned past the full-on position, reduced the flame sufficiently for simmering, without waste. An added advantage was that it was not necessary for the user to look under the pan to know the size of the flame. The lecturer mentioned that great attention had been paid to the question of combustion of the gas. It was the possibility of the production, under certain conditions, of carbon monoxide which had sealed the doom of the ring burner.

SMOTHERING.

It is especially important that the design of the burner and the bar be such that the gas is completely burned under all reasonable conditions of use. Careful attention has been paid to this point in the design of the new burners. It will be found that even when the consumption of gas is increased by 50 p.ct. more than the rated consumption, and a large kettle placed over the burner, there is no smell of unburnt gas. For such an increase in consumption to occur, it would be necessary for the pressure at the gas rail to rise to about 2¼ times that existing when the burners were adjusted.

REDUCTION OF RATED CONSUMPTION.

While the burners are sufficiently powerful to ensure reasonably rapid boiling, it is desirable that the consumption shall not be so high that excessive waste of gas results when vessels are left boiling longer than is required—that is to say, the unavoidable losses in domestic use must be kept down as much as possible. It is for this reason that Messrs. Radiation have not reduced the time factor, but have lowered the consumption. Not only is waste thereby minimized, but—what is equally important—the volume of products discharged into the kitchen (often ill-ventilated) is correspondingly decreased.

Dealing with the controversy in the "Manchester Guardian" regarding carbon monoxide production, and gas-fires, Dr. Hartley said that the evidence given there was absolutely valueless. His firm, as makers of gas-fires, had made a most thorough examination of this question. With a properly adjusted burner, carbon monoxide production is eliminated in the gas-fire.

The lecturer next dealt with the design of the oven. In this the makers have departed fundamentally from that previously adopted. As the result of an examination of the chemistry and physics of the cooking processes, they had satisfied themselves that a decrease in the excess of air passing through the oven would tend to improve the cooking results; and they decided to work in the direction of a decreased flue loss.

Heat is dissipated in two ways from the gas oven: (*a*) Through

the walls. (*b*) Through the flue outlet. To reduce effectively the loss through the walls involves a large increase in the thickness of insulation, and the additional cost involved is out of all proportion to the annual saving which results. Economic conditions thus restrict progression along this line. The other source of loss has proved more amenable to restraint.

In the old type of gas cooker a great defect was that too much air passed through the oven. It had been revealed, during close research into the subject, that when less air passed through the oven, it had a tendency to improve the cooking results. It was decided, therefore, to work for a decrease in the amount of flue loss; and in the "New World" oven a most pronounced departure from the design of previous ovens was made. This was to put the flue at the bottom, instead of at the top, as had previously been done. It was found that this alteration effected a remarkable improvement in the cooking results obtained, and also resulted in a considerable saving in gas. The temperature of the oven was more evenly distributed and more uniform, and was not affected by increased draughts to nearly the same extent as were previous types of ovens.

Dr. Hartley next spoke of the introduction of the "Regulo" automatic oven-heat control in these cookers, which provided for an entirely automatic working, and itself regulated the gas so that the user, when guided by given times and settings, found it an extremely easy matter to do the cooking, as the cooker could be left entirely to itself until the specified time had elapsed; the user returning to find the food perfectly cooked.

ADVANTAGES OF THE "REGULO."

This device, then, enables given conditions to be attained from day to day with the oven. In the actual process of cooking it offers very many advantages. With it, it is only necessary for the head to be rotated to the required position (determined by the character of the food to be cooked), the gas turned on, and the burner lighted. At the end of ten minutes or so the oven is hot (as is shown by the fact that the flames have become small), the food is inserted, and no further attention is necessary until the time required for complete cooking has elapsed. At the end of that period the food can be withdrawn. During the cooking operation the oven requires no watching. The operator is no longer dependent on her judgment of the flame length for determining the conditions within the oven. Once the position of the graduated head is set, the temperature within the oven is determined. Waste of gas and burning of food are avoided, and—a point which will appeal most to the housewife—other housework can be carried out without fear of spoiling the food in the oven.

The adaptation of this thermostatic principle to these cookers, said Dr. Hartley, was an outstanding improvement, and rounded off the excellent features embodied in the design of the oven generally.

Coming to the "New World Junior" cookers, these embodied the same principles of oven construction as the "New World," but were generally smaller in size. The experience gained in the design of the "New World" cooker paved the way for an additional simplicity and minimization of the hotplate parts by the development of the unit system used in this earlier model. The working parts of the hotplate had been reduced to five only, which were: One long burner, one short burner, one grill burner, one grill fret, and one hotplate bar, which were common and interchangeable throughout the whole series of three different-size cookers. In general, all but the "width" parts, both in the hotplate and elsewhere, were common and interchangeable.

The "Rado" burner used in the hotplate could be turned-down without extinction, or lighting-back, to 1½ c.ft. consumption per hour, providing a most economical working heat for stewing, simmering, &c., while complete combustion was obtained, and consequent freedom from odour.

Discussion.

The CHAIRMAN said they had all listened to Dr. Hartley with keen interest. He would like to ask the lecturer whether he had determined the actual thermal efficiency of the "New World" oven when doing normal work.

Dr. HARTLEY replied that the thermal efficiency had not been determined. It was a most difficult figure to calculate, and the results varied according to the loading of the oven and the temperature. A most interesting attempt to arrive at a basis of comparison had been made some years ago in the John Wright laboratories, when what might be termed the "per cent. inefficiency" had been calculated. The most inefficient oven would be a simple iron box with no lagging. From a comparison between the number of B.Th.U. required to maintain a given temperature in this oven with the amount used in performing the same work in another, the percentage saving could be determined. This was an ingenious endeavour. There was no question, however, that the best way yet proposed of assessing the relative merits of two ovens was the bread-baking test.

The CHAIRMAN asked what was the heat loss of an oven.

Dr. HARTLEY said it was difficult to say what this amounted to. In the "New World" cooker the carbon-dioxide content of the products varied between 6 and 7 p.ct. There were two ways of avoiding heat loss. One method consisted in packing the oven with more insulating material; the other was by reducing the quantity of excess air passing through the oven. With regard to the former, the practical limit of packing had been reached. Any additional packing would so increase the cost of the cooker as to render the method unjustifiable. It was for this reason that Radiation Limited had concentrated on reducing flue losses; and it was interesting to observe that formerly the carbon dioxide content of the flue gases was in the neighbourhood of 2 p.ct., only.

Mr. D. J. WINSLOW (Lea Bridge) remarked that sometimes the efficiency of a gas oven was given as 11 p.ct., and that of an electric oven as 21 p.ct. He would like information on two other points. One was as to the likelihood of carbon monoxide being produced by incomplete combustion; the other concerned the enamels of the ovens. Had the makers provided against the risk of fracture of these enamels?

Dr. HARTLEY asked if the efficiency figures mentioned by Mr. Winslow were based on the investigations of Mr. A. H. Barker, of University College, London. Mr. Barker had employed a calorimeter in his tests; and though he did not wish unduly to deprecate the results, he felt that they were apt to be misleading. It was true, however, that on a maintenance test the gas oven gave a higher factor than the electric oven—in other words, the temperature was maintained in the electric oven with a less expenditure of heat in the form of electrical units than the amount required in the form of B.Th.U. in the gas oven. When cooking was done, however, the B.Th.U. consumption became equal, presumably owing to the steam loss which occurred during the process. With regard to carbon monoxide, this could only be formed as the result of partial combustion—an event guarded against in the "New World" cooker. If by some means or other the inner cone of the bunsen flame were broken, then it was true that the carbon monoxide of the interconal gases might escape unburnt; but they had so spaced the burners and their distance from the utensils that the likelihood of this happening was very remote, and negligible. It was interesting to note that a content of 5 parts of carbon monoxide in 10,000 of the products could generally be detected, owing to the presence of strongly-smelling substances formed at the same time. As to the enamels of the ovens, they were making enamels which would withstand brusque treatment. At present consumers were warned against overheating the enamel, and, what was more important, of spilling hot liquids on it.

Mr. D. CLEAVE CROSS (Lea Bridge) remarked that it was often suggested that the products of combustion affected foodstuffs. Perhaps Dr. Hartley would give them some information on this point. He would also ask the lecturer whether the thermostat became unduly hot at the adjustment.

Dr. HARTLEY, dealing with the last question first, suggested that this could best be answered in a practical way; and he invited members to examine the "Regulo" on a "New World Junior" cooker which he had used for demonstration purposes, and which had been alight for an hour. With regard to the effect of the products of combustion on food, he could say definitely that they had no deleterious effect. The increased steam concentration in the "New World" oven produced better bread, and, by the formation of caramel, gave it a more pleasing appearance. To prove that the products had no influence on the materials being cooked, Dr. Hartley cited an interesting practical demonstration. Custard, red herring, and onion were cooked simultaneously in a gas oven, and there was no trace of onion or herring flavouring in the custard, showing that no absorption had taken place.

Mr. J. G. JOYCE (Gas Light and Coke Company) commented on the "dampness" of a joint when cooked in an electric oven.

Dr. HARTLEY said that this was probably due to the sides of the oven being overheated. He would not suggest that electricity was an inefficient cooking agent. It was not; but its cost greatly limited its application. A disadvantage with some electric cookers was that there were only three adjustments, and that when changing from one to the other, considerable lag took place. On this account it was difficult to get the last ounce out of an electric oven.

Mr. J. R. GALE (North Middlesex) suggested that there was insufficient clearance in the cooker grids. Could the makers do something to remedy this? Would it not be a good thing, he asked, if further attention were paid to the manufacture of externally-heated ovens which obviated all question of products?

Dr. HARTLEY said that additional cost, and the knowledge that it was unnecessary, accounted for the lack of concentration on externally-heated ovens. These, of course, had been put on the market, but the sales had always been small. As for the grids, there was certainly no difficulty in overcoming the possibility of sticking, referred to by Mr. Gale. It was all a question of cost of manufacture. If 100 p.ct. efficiency in mechanical construction had to be guaranteed, the first cost of the cooker would naturally be greatly increased.

The CHAIRMAN said they were all very much indebted to Dr. Hartley for the account of the work done by his firm to improve the general efficiency of the gas cooker. He had supplied gas salesmen with a goodly supply of ammunition for their campaign against competition, and for dealing with the misleading statements put forward.

Mr. H. W. KERRIDGE (Croydon), in proposing a vote of thanks to Dr. Hartley, thought there might be disadvantage in having the flue horizontal and at the side of the cooker. Would it be better to have a vertical discharge? In the "New World" cooker the gas industry had an excellent appliance; and it was up to them to see that it was correctly fixed and properly maintained.

Mr. J. H. GOLDSMITH (South Suburban Gas Company) seconded the vote. He also questioned the advisability of having the flue outlet at the side of the cooker. Did its position near the burners render it liable to carry away heat from them?

Dr. HARTLEY said it had given him great pleasure to speak at their meeting, and he warmly appreciated the interest they had shown. With regard to the flue outlet, most cookers discharged their products horizontally. Its position near the oven burners did not result in any undue heat loss. It would, of course, be a simple matter to fix a vertical outlet; but, here again, this would mean additional cost. In installing the cooker, it was always possible to fit an open-ended T piece, if desired.

Scottish Junior Gas Association—Eastern District.—A visit to the coke ovens at East Plean, Stirling, will take place on Saturday, Dec. 13. At the conclusion of the inspection the visitors will be entertained to tea at the invitation of the Plean Colliery Company, Ltd.

WALES AND MONMOUTHSHIRE JUNIOR GAS ASSOCIATION.

The Third Meeting of the session was held at Aberavon on Saturday, Nov. 29, when, through the courtesy of Mr. A. J. Bond, Engineer and Manager, a visit of inspection of the gas-works was made. The journey round the works was made under the guidance of Mr. Bond, who explained the various processes at work. The charging and discharging of retorts by Messrs. Drakes' machine were witnessed, and altogether the visit was most interesting and of high educational value. The members were subsequently invited to tea; and later the general meeting of the Association was held at the Municipal Buildings, under the presidency of Mr. B. J. BELL, of Cardiff—Mr. W. Clarke Jackson, of Neath, and Mr. Bond being among those present.

The SECRETARY announced that letters of apology for non-attendance at the meeting, and conveying good wishes, had been received from Messrs. J. H. Canning (Newport), H. D. Madden (Cardiff), Octavius Thomas (Pentre), D. Muir (Pontypridd), and W. H. Johns (Swansea).

Mr. T. A. CANNING (Newport) moved a vote of thanks to Mr. Bond and the Aberavon Corporation for the hospitality and facilities afforded the Association. Their visit to the works had been most interesting.

Mr. W. E. CROWLEY (Newport), seconding, stated that Mr. Bond had most readily acceded to the suggestion that they might make arrangements for a meeting at Aberavon.

The vote was carried with acclamation.

Mr. BOND, in reply, said it gave him great pleasure to welcome the Association. The Mayor of Aberavon would have been present, but was unfortunately prevented by another engagement. Mr. Bond referred to the progress they were making, and hoped that the Association would again pay them a visit.

Mr. G. H. G. HUGHES, of Chepstow, then delivered a paper on

GAS DISTRIBUTION.

Gas distribution is a comprehensive subject. It commences at the works, and its boundaries are constantly being extended as new methods and apparatus come into use. No two districts are alike, but the principles of distribution are everywhere similar.

MAINS.

During the last twenty years, gas has become a household necessity; and mains which formerly supplied a few public lamps and perhaps three or four ordinary consumers have now to supply almost every house. Further to the increased demand in the old areas, building developments have added considerably to the difficulties of affording an efficient supply of gas. The remedy in some instances has been fairly simple. In the case of a shortage at one point, a larger main may be laid from a position nearer the works, or an auxiliary connection may be made with a portion of the system having gas available.

If a district which is supplied direct from the works has a demand which at times exceeds the supply, and the initial pressure cannot be increased, a booster may be installed. This installation could be so arranged that at times of normal demand, when the holder pressure is sufficient, the supply passes at ordinary distribution pressure through a by-pass controlled by a valve. When increased pressure is needed, the by-pass may be closed, and gas passed through the booster. To prevent the pressure in the district rising above a predetermined point, an adjustable automatic return valve may be fitted on a by-pass main between the inlet and outlet of the booster. This case of shortage is usually due to a steady increase in consumption; and the means suggested will meet the demand for a limited period.

Other cases have presented a great deal of difficulty, especially where streets of houses have sprung up, and rural areas have been converted into thickly-populated districts requiring a supply of gas. Another problem is the growth of small villages a few miles from a town, where the inhabitants see the advantages of the use of gas, and demand a supply. To substitute existing by larger mains to any great extent is often out of the question, owing to the expense involved, and, maybe, the already congested state of the subsoil of the roads. Then a high-pressure installation is the best way of dealing with the problem. High-pressure transmission has many advantages. Room may be found for a smaller main in the crowded subsoil of the road, when it would be out of the question to lay a large-size low-pressure main. Diversion from the principal thoroughfares to side streets by a less direct route, if necessary, would be possible, owing to the smaller cost of pipes. The high-pressure main could be tapped, governed, and connected to the low-pressure system where needed; and for a town surrounded or partly surrounded by villages which required gas, a circular high-pressure main could be laid round the outskirts, each village having its governor and low-pressure supply. In addition the high-pressure main could be connected to the smaller low-pressure mains at the old boundary, feeding back and so remedying the shortage which sometimes occurs in outlying districts at times of peak load. This system means the installation of compressors and governors, but in return the consumer has an adequate supply of gas, while the undertaking has a system of supply capable of meeting any demand which may arise for many years. Which system it is best to adopt depends entirely on local conditions; but it is advisable to take a broad view of the situation, so that the one finally adopted will not only be capable of meeting immediate demands, but will also supply future needs.

SERVICES.

Now that cookers have become so general, gas fires, circulators, geysers, &c., will also become popular when people fully realize their advantages. Regarding the size of services, we should allow for the coming increase in consumption; and as the ½ in. services of the past gave way to the ¾-in., so the ¾-in. should now be superseded by the 1-in. The latter would soon repay the small extra cost per service, and would bring an ample supply up to the meter. The life of a service is anything from twenty to forty years, and in less time than that we may have the all-gas house as a general rule. Pipes are apt to corrode where the service passes under the channelling before entering the footpath. I have found services, when uncovered for leakage, badly pitted with rust. The damage, which is due to moisture, is confined to about 2 ft. under the channel stones, the remainder of the service being in excellent condition. Some extra protection for this portion of the service is therefore advisable. The pipes should be tarred and wrapped with cloth before laying, or covered in the trench with a good coating of cement for a least a foot on both sides of the channel. The covering not only protects the service from damage by the water which percolates from above, but it also isolates it from the clinging, cold, wet earth, which, by lowering the temperature of the gas, causes deposition of naphthalene.

All services should enter the building under ground. "Jumping" up the wall is a bad practice; an exposed pipe being the cause of naphthalene trouble, as it is not protected from changes of temperature. Another reason why the practice should not be tolerated (and this in addition to its unsightliness) is that, where the pipe leaves the ground, the rain collecting round it soon causes rust. If it is not possible to take the service straight in, and the wall has to be "jumped," then the wall should be chased, and the pipe protected by filling-in the chase with cement.

METERS.

Under-sized meters are responsible for a great deal of unaccounted-for gas. An overworked meter means incorrect registration. The coin attachment in prepayment meters has, in my experience, given cause for many complaints, which have arisen through faulty working of the valve. In the newer meters this has been rectified to a large extent, but time alone will show if the improvements are lasting.

INSIDE PIPING.

With regard to inside piping, there is usually a tendency—generally for reasons of false economy—to put in sizes which merely supply immediate wants, and which in some cases supply these inadequately. Modern apparatus often require fairly large quantities of gas for short periods; and it is for the possible maximum that provision has to be made. Nothing to my mind is more detrimental to the sale of any appliance than to tell the prospective customer that, to instal what they require, new piping will have to be laid from the meter. How much easier it would be if, when the house was piped, points for gas fires, &c., were installed, and allowance made for future installations in the size of pipe.

FITTINGS.

The general tendency of design is for a light and slim effect, but lightness may be carried to a degree which means an unsafe fitting. All fittings should be thoroughly examined before selection; and care should be exercised to see that movable parts (tap and ball-joints) are of a strength to ensure against leakage. Something ought to be done to prevent the use of inefficient burners. When these cause complaints, it is best to refuse to do anything to them, pointing out the advantages of a good burner.

The advent of the superheater burner has done much to strengthen our position in the lighting field, by its increased efficiency. It allows of the use of smaller mantles, the life of which is much longer than the larger ones. The Vitreosil globe, with its absence of glare, gives a more pleasing light. Through its immunity from heat breakage, it can be used close to the mantles, without fear of cracking. This proximity increases the temperature of the mantle, and this results in a greater light output per c.ft. of gas used. This combination of superheater and Vitreosil globe has resulted in the production of burners of higher efficiency and of much neater dimensions.

GAS FIRES.

The whole of the products of combustion from a gas fire must go up the chimney; and if the slightest smell is noticeable, there is something wrong somewhere.

In fixing a gas fire in front of a smoky chimney, the first thing is to have the chimney thoroughly swept. If the fire selected does not cover the grate opening, the whole of the chimney opening must be stopped with sheet iron or art metal (the latter makes a more pleasing surround) and only a hole left suitable for the flue to enter. About two or three lengths of flue piping of sufficient dimensions to deal with the products are fitted on top of the elbow, and thrust-up the chimney. A cover is placed on top, so fitted that it does not restrict the opening, but prevents dirt from falling down the flue. This will effectively obviate any ill effects from down-draught. If a chimney has an excessive pull, a reduction, immediately behind the surround, in the flue pipe will obstruct

the rush of cold air over the fuel, and prevent the consequent lowering of the temperature of the fire.

The regulation of a gas fire is a very important point. The best results are obtained when the gas and air are regulated so that the tip of the flame reaches about three-quarters up the radiant. The flame should not be sharp, but the inner cone should be discernible. In daylight, the top portion of fuel does not appear to be red. If the room be darkened, however, you will see the fire as it really is; and any excess above the top radiant is wasted up the flue. This regulation will give about 3½ to 4 c.ft. per hour per nozzle.

There are at present a large number of flueless gas heating stoves for sale. The advantages claimed for them are that, being light in structure, they are easily removable from room to room. It is stated that there are no fumes or smell while burning. As they are cheaper than the more substantial fire, and the expense of installation is also generally less, they appeal to a considerable number of consumers. The first claim, portability, means the use of flexible tubing with rubber push-on ends. The result of connecting and disconnecting is that the rubber end increases in size sufficiently to cause leakage. As regards the second claim, "no smell," there are still the products of combustion to be reckoned with; and in an ill-ventilated room the effect of these is soon felt by the occupiers. It therefore behoves gas undertakings to see to it, as far as possible, that no stove of this type which they sell should be for use in a room for which it is not suitable, and that the connection is permanent. Under no consideration should a gas fire with a flexible tube connection be fitted in a bedroom.

COOKERS.

Boiling burners should always be regulated after allowing sufficient time for the burner to get hot. The tip of the flame, with its inner cone visible, should just come in contact with the bottom of the utensil. The oven burners can be examined by means of a small looking-glass. A sharp clear flame should be aimed at. If the flames are inclined to smother, and part of the burner goes out, the gas must be reduced at the injector until the correct flame is obtained. This may not always be due to an excess of gas, as the flue may be at fault. If the flue is not functioning, the waste gases find egress at the bottom of the oven. (The same effect is produced when there is an obstruction in between the top plates of the oven; and the remedy in this case is to clear out this space.) The flue of an oven which gives this trouble is usually one which has been taken direct through the wall to the outside, and only functions correctly when the wind is in a certain direction. It is better to do away entirely with the piping, if a chimney is not available. If this cannot be done, and the cooker must have a flue, the difficulty can be overcome by fixing a hood having a flue pipe leading outside, and taking the oven flue up into it.

GAS IRONS.

The pressure at the iron should be such that the flame can be regulated to heat the iron sufficiently so that it can deal with any kind of ironing. Owing to the small consumption of these appliances, it may be thought that any sort of connection will answer the purpose, and often they are fitted on to the end of swivel brackets (single or double) by means of a combination tap. For the gas to get to the end of the bracket it has to pass through the restricted space of swivels and taps, and alter its direction of flow two or three times. These obstructions mean reduced pressure, which in many cases is sufficient to prohibit proper mixing taking place in the burner of the iron. Irons should always be fixed to a separate fitting, supplied by its own piping, on the wall or ceiling as the case may be, independent of the lighting fixtures; the tubing from the fitting to the iron being the minimum length suitable for the fullest sweep the iron is required to take. Regulation should be such that the flame roars a little when first lighted—the fingers can be placed over the holes to prevent lighting-back. This regulation produces a hot flame and prevents the formation of soot; it also thoroughly consumes the gas and obviates any smell.

PUBLIC LIGHTING.

The advance in the construction of lanterns and the adoption of the superheated inverted burner have brought before the public the capabilities of gas for public lighting. Sometimes, however, we see these results robbed of much of their effect by the low altitude of the lighting unit; the modern lanterns being fixed on columns which formerly did duty for the flat-flame burner. When this type of burner, with its lower candle-power, was in use, its height from the ground-level was just what was required for the proper diffusion of the light; but now we have a light many times more powerful, and which has in addition a reflector designed to direct the rays so as to illuminate a much larger area. Under the lamp the illumination is brilliant. Outside this bright ring the light diminishes quickly, and by comparison with the brighter spot has very little illumination. The effect produced in a street so lighted is "patchy." An increase of about 3 ft. in the height would not only give better diffusion, and thereby eliminate to a large extent the dark and light patches, but would also raise the light above the range of vision of the drivers of vehicles, and prevent dazzling. It is not necessary to replace the columns by longer ones, extension pieces can be fixed on the collar of the old column.

On lamp services, near to the base of the column, a long screw should be fitted in every case, so that as little ground as possible would have to be disturbed when renewing the piping in the column, which, being partially exposed to the weather, is liable to leakage from rust. It is also convenient for clearing-out a stoppage in the bend at the bottom, due to internal corrosion, and the rust lodging there.

To ensure the best results from public lamps, a well-organized system of maintenance is essential. The burners should be cleaned thoroughly each time mantles are required—more often than this, if necessary. Mantles of the inverted type, and especially the smaller sizes, remain intact for a longer period than it takes a burner exposed to dust and insects to get into a dirty condition. The glass should always be clean, as it is possible to rob a lamp of 50 p.ct. of its light by reason of its not being able to penetrate the glassware. The reflector is an important part of the lantern, and should be cleaned as frequently as the glass. Public lighting is an advertisement for gas which is always before the public; and if undertakings wish to reap benefit from this advertisement, it is well to keep everything in good condition.

GAS ENGINES.

When arranging the supply pipes in fixing a gas engine, first find the positions of meter, gas bag, silencer, tank, and air box, and then plan the piping to suit the positions. The size of the various connections on the engine regulates the size of pipe required for each purpose; but if any of the lengths are unduly long, it is better to use the next larger size. Bends should always be used, not elbows. The principal points to be remembered are: The gas bag should be blocked away from the wall to allow of its fullest distention, and so that the hand can be inserted to determine whether the supply is sufficient. The exhaust pipe fixed away from the woodwork, owing to the danger of fire. The water circulation run so that no air can lodge in any part. A cock provided on the pipe from tank to cylinder, so that the water can be shut off from the cylinder, and the cylinder emptied by means of a draw-off between the cock and the cylinder in frosty weather, to prevent fracture, and to facilitate repairs to the water jacket. A tap in the gas pipe near the engine should be inserted to clean-out pipes, &c. Failure to start, and loss of power, may be due to many causes. If on examination the gas supply and meter are found in order, the valve in the gas bag should be tried, as it may stick and restrict the flow. If this works freely, the fault is in the engine, and may be due to the ignition. If tube ignition, the tubes may not get hot enough, and may not be the right length to suit the engine. In engines which have an adjustable height for the burner, this may require readjusting to fire the charge at the correct moment. Loss of compression may be felt by turning the engine on to its compression stroke, when all valves should be shut; and if it escapes through the open end, the cylinder must be taken out, all carbon deposit scraped away, and the rings made free. Dirty valves (due to faulty seating) are another cause of loss of compression. They should be taken out, cleaned, and ground into their seating; care being taken to see that, after replacing, the adjustment of the lever working the valves allows them to drop on to their seats. If from any cause the water does not circulate, the engine will run with irregular speed. It should always be possible to place the hand on the cylinder. Gradual slowing-down and eventual stoppage may be caused by an accumulation of carbon in the exhaust, or by condensed water backing-up through a stoppage in the outlet.

OBTAINING AND RETAINING BUSINESS.

Obtain the confidence of the consumer. A satisfied consumer will do as much good as a dissatisfied one will do harm. An interest shown in the article after fixing is usually appreciated. The installation of household apparatus on approval is a means of increasing consumption, and would show the general public the confidence you have in the article you recommend. This practice would have to be limited, and each case judged on its merits. A system whereby inquirers for apparatus or fittings could, at the time of their visit, be told the total cost of their purchase, including fixing, would also be a means of making a probable purchaser into a certain buyer. Some undertakings fix cookers, fires, and boilers free, so that no difficulty arises when inquiries about them are made. But when the inquiry is for lamps, fittings, burners, lights, irons, &c., for which a charge is made for fixing, the cost of the article is all that can be supplied at the moment, and the fixing cost has to be ascertained by a visit to the premises. This means delay; and in the meantime the inquirer has perhaps changed his mind and/or bought a substitute. The cost of fixing a certain article or doing work in one house does not differ greatly from a similar job carried out in another house, so that it should be possible to arrange a price. Prepayment consumers, who have no accounts, from the inclusive prices given would be able to pay when the order was taken; and this would obviate the trouble of collection.

Discussion.

Mr. W. CLARKE JACKSON said it gave him great pleasure to move a vote of thanks to Mr. Hughes. There were several points which would prove fruitful for discussion.

Mr. T. A. CANNING, seconding the vote, agreed with Mr. Hughes in his remarks respecting flexible tubing. Some endeavour, however, should be made to produce efficient and odourless portable flueless gas heaters and a tube the joints of which were thoroughly gas-tight.

Mr. WOOD (Pentre) supported the vote. They had listened to an excellent paper, and he ventured the observation that service difficulties which had been referred to by Mr. Hughes might be overcome by inserting the services in other pipes.

Mr. BROWN (Cardiff) suggested that it might be an advantage if the

young men in the industry could be given an opportunity of seeing the Technical Press and text books available, whereby they might obtain necessary information.

Mr. WALROND (Cardiff) expressed the pleasure he felt at being present. Meetings of the Association were of interest to all connected with the industry. In his opinion, rubber ends on flexible tube should be superseded as far as possible by brass connections with male and female ends.

Mr. A. J. BOND suggested the use of tar preparations as a preservative for services, and gave the result of his experiences. He congratulated Mr. Hughes on his paper.

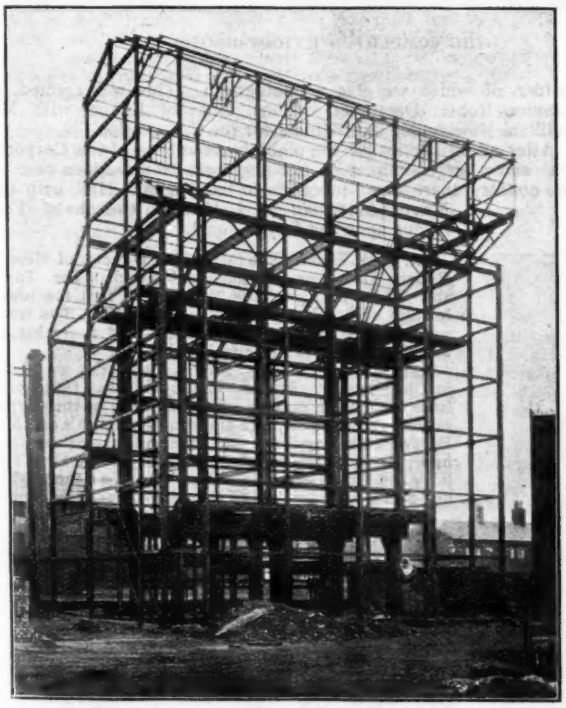
Mr. B. J. BELL, concluding the discussion, referred to electrical competition and the necessity for educating themselves and then the consumers. Gas for lighting could do what electricity could not—that was, afford healthy ventilation.

Mr. HUGHES expressed his appreciation of the way in which his paper had been received, and replied briefly to points raised in the discussion.

The SECRETARY informed the members that he had been advised by Mr. Octavius Thomas that the Wales and Monmouthshire District Institution had again shown their interest in the Association, and their desire to help, by allotting the sum of ten guineas for the purpose of giving prizes or premiums to the members of the Junior Association, at the discretion of the Council of the Institution. On behalf of the members, the Council of the Association returned thanks for this generous support, and would keep the members informed in regard to this matter.

INAUGURATION OF NEW GAS PLANT AT CONGLETON.

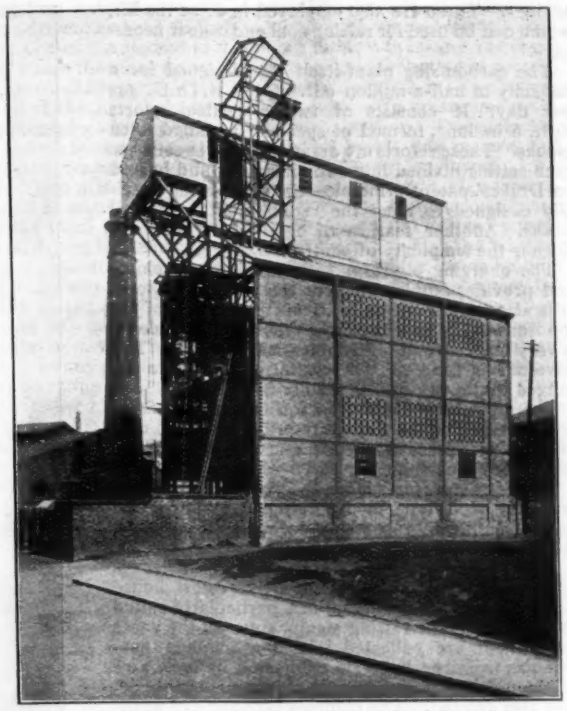
New plant at the Congleton Gas-Works which was officially inaugurated on Wednesday last holds many features of interest to those engineers who are closely following developments in vertical carbonization as applied to smaller gas-works. The contract for the retort house and complete carbonizing plant was entrusted to Messrs. Drakes, Ltd., of Halifax, who, though perhaps better known for their contributions to the improvement of horizontal carbonization, are nevertheless specialists also in vertical retorts, and, indeed, were actually erecting them sixty years ago.



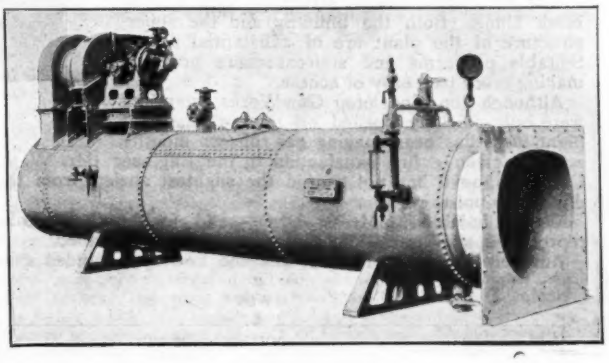
Vertical Retort House in course of construction, showing steel framing. (Drakes, Ltd.)

At the outset the usual problems attending the design and construction of a plant of this kind were somewhat accentuated by local conditions. During the digging of the foundations water was discovered at a depth of 4 ft., and in such quantities that it was difficult to deal with. For this reason it became necessary to devise a supplementary elevator to handle the coal. The actual foundations for carrying the superstructure were taken down to a depth of 7 ft.; the bottom being of massed concrete up to the water level, and thereafter reinforced concrete beams.

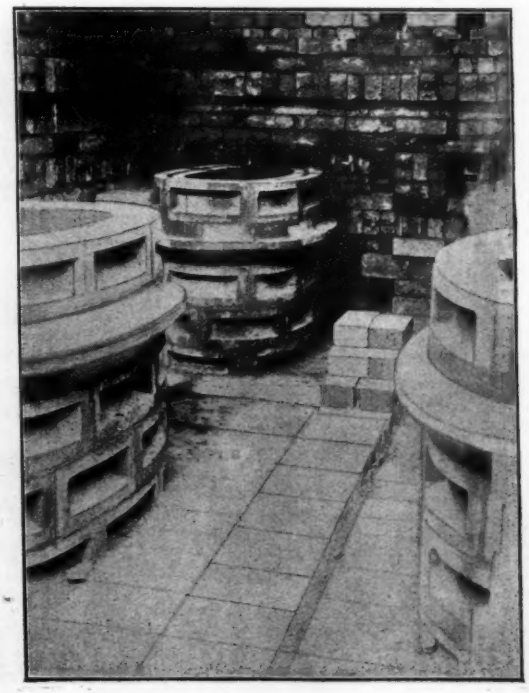
The coal-handling arrangements for the plant include a hopper and short elevator which feeds at a higher level into a two-roll coal breaker. From here the coal is passed through a rotary filler to a gravity bucket conveyor which distributes it into overhead storage hoppers having a capacity of 48 hours' supply. The whole of this section of the plant is driven by "National" gas



Retort House at a later stage, showing Brick Panelling.



The Waste-Heat Boiler.



Silica Retorts in course of erection.

engines. These are also employed to drive the lift, which can be used for raising coal and coke if necessary.

The carbonizing plant itself was designed for a capacity of half-a-million c.ft. of 500 B.Th.U. gas per day. It consists of twelve vertical retorts 24 ft. 6 in. long, formed of specially moulded silica blocks. These retorts are arranged in three settings, each setting divided into two chambers and heated on Drakes' patent principle—the plant being specially designed to meet the requirements of small works. Another feature of Drakes' vertical settings is the simplicity of control.

The charging platform is particularly spacious, and provides ample room for the stokers at work. It is also remarkably cool. The arrangement of the top ironwork is neat and clean—cleanliness, indeed, is very marked, and tar troubles are unknown. The governor is fixed on this platform, and is so arranged that every part is readily accessible.

The producers are laid out on the ground floor, and arranged on the step-grate principle. The tops of these producers are joined, and are paved-out to form a charging stage.

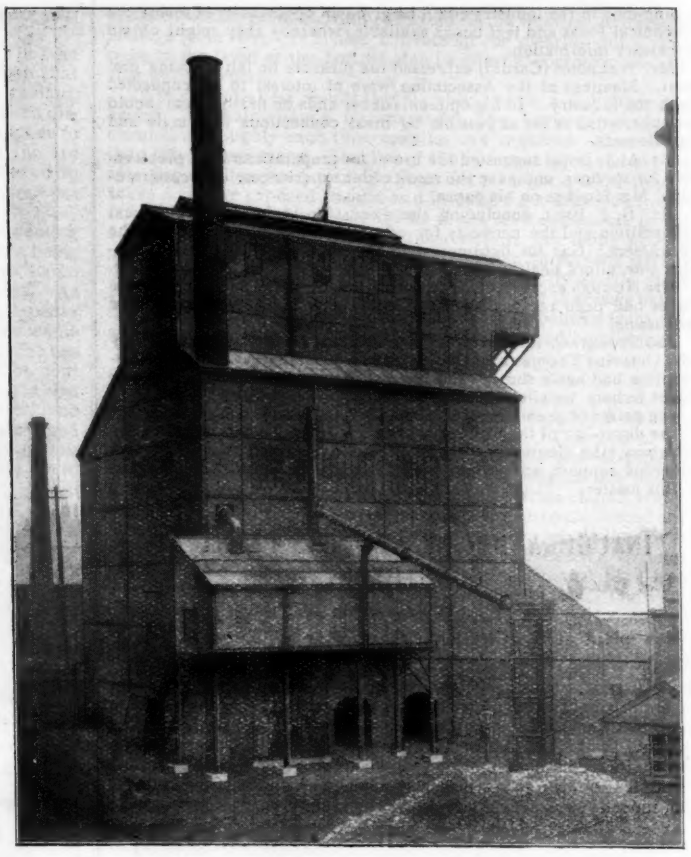
The extractors included in the plant are of Drakes' revolving drum type, incorporating a simple device for regulating the speed of carbonization. They are operated by reciprocating rods.

A "Spencer-Bonecourt" waste-heat boiler is placed in a building adjacent to the retort house side wall. Drakes' settings are particularly suited to this method of raising steam, since all the gases from them are collected into one common flue. The gas from the boiler is exhausted by means of a steam-driven fan. A steel chimney, brick-lined, was also erected. The chimney is capable of working the plant when the boiler is out of commission for cleaning or repairs.

The building is a steel structure, with a 4½-in. brick filling. Both the building and the superstructure of the plant are of substantial nature. Suitable platforms and staircases are provided, making every part easy of access.

Although the Congleton Gas-Works extensions were only officially opened on the 3rd inst., the plant itself has been making gas thirteen months, and has given entire satisfaction to the Engineer (Mr. W. A. Cartlidge), as it has not caused the slightest anxiety from the day it was put to work.

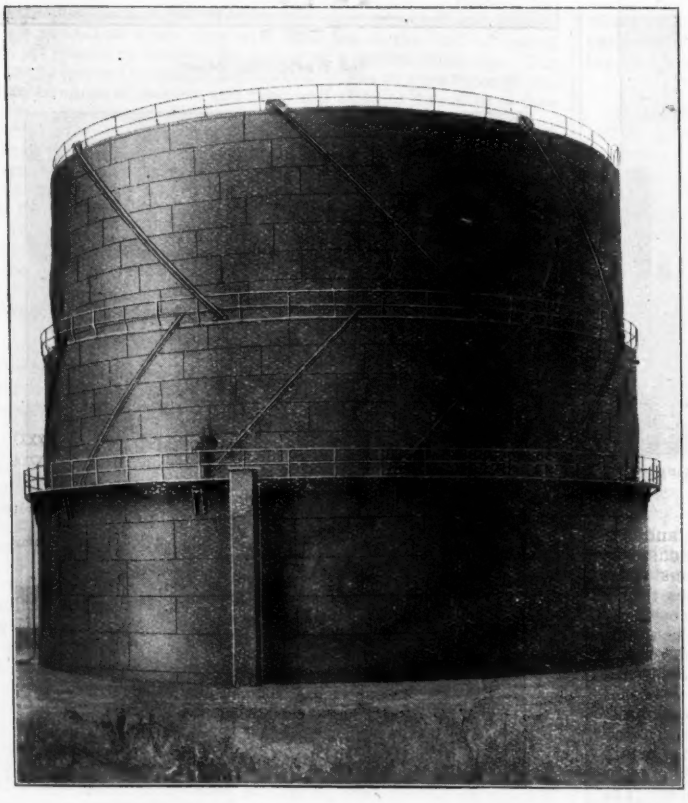
We are indebted to Messrs. Drakes, Ltd., for the photographs reproduced, showing various aspects of the plant described.



THE COMPLETED RETORT HOUSE.

Another interesting feature was the new spiral-guided gas-holder, of which we give a photograph. This was erected by Messrs. Robert Dempster & Sons, Ltd., of Elland, with Mr. William Newbigging as Engineer for the Corporation.

After an inspection of the plant by members of the Corporation and a large number of gas engineers from various parts of the country, there was a luncheon in the Masonic Hall, with the Mayor (Alderman W. I. Fern) in the chair. Following upon the Loyal Toast,



NEW SPIRAL GUIDED HOLDER (Robt. Dempster & Sons, Ltd.).

Mr. J. W. BROADHEAD (Managing-Director of Messrs. Robert Dempster & Sons) submitted "The Town and Trade of Congleton," remarking that the town, in spite of its old age, retained its youth. The trade was varied, though perhaps not so varied as the Mayor and Corporation would like it to be.

The MAYOR, in reply, said a gas-works was built in Congleton in 1832, and in 1865 this was taken over from the Congleton Gas Light Company by the Corporation. Alterations were made in Mr. Smith's and Mr. Broughton's time, and the splendid extensions they had seen that day had been carried out by Mr. Cartlidge and Mr. Newbigging. They had now a thoroughly up-to-date works, of which they might justly be proud.

Alderman TAYLOR (Chairman of the Gas Committee), proposing "The Contractors," said the Council had been in difficulties with regard to the gas works, but these had now been successfully overcome, and the work had been excellently carried out by Messrs. Drakes, Ltd., and Messrs. Robert Dempster & Sons, Ltd.

Mr. J. WILFRID DRAKE, responding, said the contractors were very much indebted to the Corporation for the confidence they had placed in them, and it was gratifying to them to know that the Corporation and their Gas Manager had no regrets. In Mr. Cartlidge the Corporation had a Manager who knew his job, and had the courage of his convictions. He told them what he wanted, and having got it he worked it. This was the right sort of engineer, and he trusted the plant they had put down would do good service for many years to come.

Alderman JACKSON gave "The Visitors," to which Mr. A. MACKAY replied.

Alderman S. MASKERY then proposed "The Consulting Engineer."

Mr. W. NEWBIGGING, in response, said that in Mr. Cartlidge the Corporation had a man of very clear judgment, and one who he thoroughly believed would occupy a much higher position than that of Engineer to the Congleton Corporation. The Corporation were also fortunate in their selection of the contractors for these extensions. He had been long enough in the industry to know four generations of the Drakes and three generations of the Dempsters. If ever he was

in a difficulty, the first people he went to were the contractors. The contractor's office was a source of knowledge, and he was never above availing himself of it. He was afraid he had been given too much credit for the extensions at the Congleton Gas-Works. Mr. Cartlidge could have carried out this work without his assistance. He wished to acknowledge the very great assistance rendered to him, not only by the late Chairman of the Gas Committee (Alderman Solly), but by the present Chairman (Alderman Taylor) and the members of the Gas Committee.

LONDON AND SOUTHERN DISTRICT JUNIOR GAS ASSOCIATION.

On Saturday, Dec. 6, about fifty members of the Association availed themselves of the opportunity kindly afforded by the London County Council to visit the Greenwich Generating Station, where the power for operating the tramways is produced.

The first point of interest was the new ferro-concrete storage hoppers which are under construction. These will contain 10,000 tons of fuel, which will be elevated to the existing coal hoppers above the boilers. The capacity of the latter is 11,000 tons. From here the visitors passed to the pumping plant for providing circulating water for the turbines. The centrifugal pumps are motor driven, and obtain their water through tunnels driven under the river bed. Adjacent to this pump room is the water softening plant where the make-up water (about 5 p.ct.) amounting at present to 20,000 gallons per day, is treated with lime and soda. The boilers are all of the mechanically-operated type, with arrangements in some cases for working on the "Sandwich" system. The control of the boilers is very efficient; calorimeters, steam flow meters, and CO_2 and draught recorders being extensively employed. In a sub-station attached to the main generating station, high-tension current is transformed down to operate the motor-driven plant and the local section of the tramway system. The feed pumps are all driven by electric power. The house in which the turbine-driven generators are situated impresses one with its magnitude and simplicity of design. Members were particularly interested in the means provided for continuously ascertaining the power used in any particular section of the vast system of tramways, and the devices by means of which, in an emergency, the steam supply to any generator can instantly be shut-off, the generator at the same time being thrown dead.

At the termination of the visit the parties expressed their thanks to their several guides, and left the power station with an increased appreciation of the magnitude of the London County Council tramway system and the efficient manner in which the power for its operation is produced.

CORRESPONDENCE.

[*We are not responsible for opinions expressed by Correspondents.*]

Gas Engines on Hire.

SIR,—I have read with much profit in your issue of the 3rd inst. the supplement to the Presidential Address given by Mr. Harry Clark to the Midland Junior Gas Association, and should like to express to him my hearty congratulations upon bringing such an important subject as gas for power purposes before the industry. In your "Editorial Notes," you invite readers to express their views through the columns of the "JOURNAL," which I feel sure must lead to a profitable discussion on the very important matter of "Gas Engines on Hire." The address has awakened the industry to its responsibilities, and brought out new ideas and practical suggestions for greater use of gas in the industrial section.

I should like to ask Mr. Clark the following question, which I feel sure must have come to the minds of those who have read Mr. Clark's address and the discussion: "What would be his basis, conditions, and charges for gas engines on (*a*) hire), (*b*) hire purchase, and (*c*) sale, and the price of gas for power purposes, to make the venture a successful one?"

"PROGRESSIVE SENIOR."

Dec. 6, 1924.

Combinations of Gas and Electricity.

SIR,—There lies behind Mr. Gill's letter in your issue for Dec. 3 a possibility of improvement in thermal efficiency and use of coal that becomes the more attractive the more it is examined. It widens enormously the scope of the gas industry as a supplier of electricity. It seems to me that the scope is no longer confined to the small districts where there is no electricity and where the gas undertaking can obtain powers to supply electricity. The field is very much greater.

Some of the combined gas and electricity undertakings for whom I designed and put down electrical plants are already consulting Mr. Gill on the question of extensions of their electricity plant by means of surplus heat recovery boilers. If they can only get 20 to 30 H.P. day and night for surplus heat recovery plant, it means fuel for nothing up to that amount; and in numerous cases the electricity requirements of the smaller towns do not reach 15 H.P. during the night, holidays, and fine days.

It seems certain that, as time goes on, gas undertakings will be supplying electric railways, tramways, and so on, with large quantities of electricity produced from surplus heat recovery boilers. I do not think there will be the slightest difficulty in obtaining the necessary powers to do this, because it is so extremely important from the point of view of coal conservation. I have one or two cases where gas undertakings have stated that they would have no objection to supplying electricity in bulk to the existing electricity undertakings to the extent of their surplus heat production.

The figures in lbs. of steam per annum available at one or two gas-works where powers are being sought to supply electricity indicate that there is sufficient surplus heat to produce all or most of the electrical energy likely to be required in those towns for at least two years. The electrical peak load can be economically supplied by gas engines.

A. HUGH SEABROOK.

146, *Bishopsgate, London, E.C.* 2,
Dec. 8, 1924.

Critical Study of Tests on Water Gas Plant.

SIR,—I hope that readers of my paper on water gas plants, and of Dr. Parker's criticism of it in your last issue, will not carry away the idea that any remarks that I have made reflect on the work carried out by the Institution of Gas Engineers or by the Fuel Research Board. I have endeavoured to pay high tribute to those concerned in these investigations; but I should be doing no service to the authors or to the industry if I did not frankly point out what I consider to be the faults which future investigators should correct or avoid.

My remark about temperature measurements does not imply that the observers were at fault, but that a more elaborate method of measuring temperatures should be employed, with a view to eliminating the unknown error due to the loss of heat by the thermo-couple to the walls of the channel through which the gas flows. As this error increases in proportion to the difference in the fourth power of the absolute temperatures of the couple and of the walls of the channel, it may become large at high temperatures. As to the loss of carbon during clinkering, &c., it may be large or small. One cannot guess at the magnitude of such errors. I did not attempt to dogmatize regarding them, but merely tried to point out the effect on the results.

I cannot in the space of this letter deal with the question of thermal units; and I shall be glad if you will give me the opportunity to do so next week. I must, however, point out that if one adopts the *accepted* value of the heat of combustion of amorphous carbon as the basis of calculations, the numerical value of the algebraic sum $P + Q$ is increased, and not diminished—a fact that does not support Dr. Parker's argument. However, a point arises in this connection which is going to form the basis of an interesting discussion.

I do not think that Items II. and III. are really as material as the figures, expressed in terms of millions of C.H.U., would make them appear to be. The error would probably affect P and Q equally. It is rather a pity that Dr. Parker did not strike out the concluding reference to "many other points." Hints are not permitted in scientific controversy. Finally, when all is said, my criticism of Dr. Parker's work amounts to the statement that the error measured by the numerical value of $P + Q$ is "relatively small," which can hardly be considered severe. He has yet to answer my criticism as to the conclusion to be drawn from his experiments.

The main object of my paper was to point out that the system of thermal statements in common use must always balance, whether the thermal accounts are in order or not. Such a system would not be tolerated in commerce, much less should it be permitted in industry. As a constructive suggestion I put forward a new scheme, and so far do I consider it imperfect that I shall be glad of criticism. In the process of working it out I came across some points which I believe to have a practical bearing on the conduct of water gas tests. The suggestions which I have put forward strengthen the case for continuing investigations on which so much thought and work has been expended. Water gas is becoming of greater and greater importance in the industry, and we have just so much knowledge of the process as to enable us to realize how much we do not know. It would be a pity to drop the work at this stage.

M. W. TRAVERS.

147, *Queen Victoria Street,*
London, E.C. 4,
Dec. 6, 1924.

Smoke Abatement Bill.—Lord Newton, President of the Coal Smoke Abatement Society, recently asked Mr. Neville Chamberlain, Minister of Health, whether the Government intended to reintroduce the Public Health (Smoke Abatement) Bill in 1925. This Bill, as amended in Committee of the House of Lords, has the support of the Federation of British Industries and the Coal Smoke Abatement Society. Mr. Chamberlain has now sent the following reply to Lord Newton: "I am happy to be able to give you, in reply to your letter of Nov. 28, an assurance that the Government do contemplate introducing a Smoke Abatement Bill as soon as possible, but there is some doubt whether it will be desirable to do so in the coming session. The Government, as was to be expected, have a number of urgent measures which must be passed into law before the end of the session: and the fate of previous Smoke Abatement Bills which were included in the slaughter of innocents at the end of the session makes me think that probably no time would, in the end, be lost by waiting till 1926, when I should hope to be able to secure for it an earlier place in the Government's programme."

LEGAL INTELLIGENCE.

HEAVY DAMAGES.

The Fatal Motor Accident to Mr. Harold G. Eveson.

The sad motoring accident last March which resulted in the death of Mr. Harold George Eveson (eldest son of Mr. G. J. Eveson, and a Director of the Eveson Coal and Coke Company and of the Staffordshire Tube Company) formed the subject of an action heard before Mr. Justice Lush and a jury at the Birmingham Assizes last week. Mr. Eveson lost his life as the result of a collision with a motor lorry owned by Ansell's Brewery Company, Ltd., from whom Mr. Eveson's widow sought to recover damages under the Fatal Accidents Act. After a hearing extending over nearly three days, the jury found for the plaintiff, assessing the damages at £5000; and judgment was entered accordingly, with costs. A stay of execution was, however, granted with a view to an appeal. The plaintiff's case was that the accident was caused by the negligence of the driver of the lorry, Robert Elliman, who was employed by the defendants. The allegation was that the lorry was on the wrong side, and that the motor car was on its proper side at the time of the impact, and the suggestion made was that the lorry was racing with another lorry. The defence was a denial of these allegations. Elliman said he saw no other lorry, and he declared that the motor car swerved and collided with his lorry. Sir Henry Maddocks, K.C., and Mr. O'Sullivan appeared for the plaintiff; while Mr. E. W. Cave, K.C., and Mr. Ward represented the defendants.

RE-INSTATEMENT OF ROADS.

On Tuesday, Dec. 2, the action of *Hillman v. Croydon Gas Company and Others* was tried before Lord DARLING and a Special Jury. The plaintiff, Harry Hillman, a confectioner and tobacconist, of No. 270, Brighton Road, South Croydon, sought to recover damages in respect of alleged negligence on the part of the Gas Company, or Messrs. Wm. Press and Son, contractors, or Messrs. Thomas Tilling, Ltd., or all of them. The contractors were employed by the Gas Company to carry out certain works and excavations in connection with a main in the road; and while this work was in progress, plaintiff said it was their duty to keep the road at all times safe for traffic. On Oct. 12, 1923, a motor omnibus belonging to Messrs. Tilling sank into the road near the plaintiff's premises, and by reason thereof skidded, mounted the pavement, and crashed into the premises, doing considerable damage to the stock and fittings. Plaintiff alleged that the accident was due to the fact that a trench which had been excavated in the road by the contractors had been imperfectly filled up. Defendants denied the alleged negligence.

Mr. HOLMAN GREGORY, K.C., and Mr. MORESBY appeared for the plaintiff; Lord HALSBURY, K.C., and Mr. WALTER FRAMPTON, for the Gas Company and the contractors; and Mr. THOMAS DRURY, K.C., and Mr. HILBERY for Messrs. Tillings, Ltd.

Among the witnesses called on behalf of the plaintiff was Mr. Horace Long, the Secretary and accountant of the Redhill Gas Company, who was travelling in the 'bus which caused the damage, and he gave it as his decided opinion that the 'bus was being driven too fast considering the slippery state of the road.

Lord HALSBURY admitted that the Gas Company were responsible for the proper restoration of the road after laying a main, but said this had been done, and the accident was due to the negligent driving of the 'bus driver.

Chas. Howard, the foreman in charge of the work, said the excavation was filled in with concrete and ballast, well rammed; and the foreman of the Borough Council duly passed it.

Wm. White, foreman in the employ of the Borough Council, who superintended the work of laying new gas mains in the Brighton Road, said the excavation between the tram lines was properly filled-up, and fit for vehicular traffic.

C. C. Wright, who supervised the work on behalf of the contractors, said he visited the spot in question the day after the accident, and found that the hole had been properly filled-in. Nothing had been done to it since that date. In addition to the gas main that they were laying, the Water Company were laying a main, and the Council were relaying the tram metals.

The hearing was resumed on Wednesday, Dec. 3, when evidence was given by several of the passengers in the 'bus, to the effect that just before it mounted the pavement it seemed to jerk or lurch. The 'bus was travelling very fast at the time.

Charles H. Croucher, a driver in the employ of the Croydon Tramways, said the 'bus passed him at the rate of about 30 miles an hour.

H. J. Willett, the conductor of the tram driven by the last witness, gave similar evidence.

Mr. THORN DRURY said there was no doubt that some one was to blame for the accident, but his case would be that the fault was entirely with the people who opened the road, and was not due to any want of care on the part of the 'bus-driver.

Mr. *Edgar O. Brown*, a surveyor, of Westminster, said he visited the spot in question on Oct. 17, and made notes of the condition of the road. The hole had been very loosely and badly filled-in, and witness would not have passed it. He saw a workman actually filling-up the trench. The condition of the road was such that a motor vehicle was bound to come to grief.

John Trapand, the driver of the 'bus, said that at the time of the accident he was running at about 8 m.p.h. He immediately went back and found a hole in the road near the tram metals. The hole was soft and squashy, and there was a deep rut of from 7 to 8 in. In cross-examination, witness admitted that his experience as a 'bus-driver had been unfortunate, he having met with two accidents.

H. E. Stacey, an insurance agent, said he was standing in the Brighton Road on the night of the accident, and saw the 'bus approaching at from 8 to 10 m.p.h. It was not true to say that it was travelling at from 28 to 30 m.p.h. The front near portion of the 'bus seemed to dip, then it gradually skidded round, mounted the pavement, and ran into the plaintiff's shop.

COUNSEL, having addressed the jury, his LORDSHIP summed up, and left the following questions to them.

(1) Was the road dangerous by reason of negligence in repairing it?—No.

(2) Were Messrs. Tilling guilty of negligence, having regard to all the circumstances?—Yes.

(3) Notwithstanding the condition of the road, could the driver of the 'bus have avoided injuring the plaintiff's shop if he had been careful in his management of the 'bus?—Yes.

On these findings his LORDSHIP entered judgment for the plaintiff for the agreed amount of £250 against Messrs. Tilling, with costs, and judgment for the Gas Company and the contractors, with costs.

MISCELLANEOUS NEWS.

GAS REGULATION ACT APPLICATIONS.

There have appeared in the "London Gazette" the following further notices regarding applications to the Board of Trade under the Gas Regulation Act.

AMENDING ORDER.

Brentford Gas Company.

(Application by the London County Council.)

The Board of Trade give notice that the London County Council have made application under sub-section (3) of section 1 of the Act for an Amending Order revising the powers of charging authorized by the Brentford Gas (Charges) Order, 1921, by reducing the standard price prescribed by that Order.

Any person affected desiring to make representations with regard to the application may do so by letter addressed to the Director of Gas Administration, Board of Trade, Great George Street, S.W. 1, not later than Dec. 17. A copy of such representations must at the same time be sent to the London County Council and to the Brentford Gas Company.

DECLARATIONS OF CALORIFIC VALUE.

Hessle Gas Company.—500 B.Th.U. (March 31, 1925.)
Nuneaton Gas Company.—280 B.Th.U. (March 11, 1925.)

GAS REGULATION ACT ORDERS.

We have received from the Director of Gas Administration a copy of the following further Order made by the Board of Trade under section 1. of the Gas Regulation Act.

Mossley Corporation.

After the declared date, the standard prices in respect of gas supplied by the undertakers shall be 9·2d. and 9·6d. per therm, and these prices respectively shall be substituted for the prices 3s. and 3s. 2d. per 1000 c.ft. prescribed in respect of gas supplied by the Mossley Corporation by section 29 (standard price and application of profits) of the Stalybridge and Mossley Gas Act, 1885.

After the declared date, "2500 therms" shall be substituted for "500,000 c.ft." "10,000 therms" shall be substituted for "2 million c.ft.," "one-fifth of a penny per therm" shall be substituted for "1d. per 1000 c.ft." and "two-fifths of a penny per therm" shall be substituted for "2d. per 1000 c.ft." wherever they occur in section 30 (discount to large consumers) of the Stalybridge and Mossley Gas Act, 1885, in so far as the said section is applicable to gas supplied by the Mossley Corporation.

After the declared date, "0·4d. per therm" shall be substituted for "2d. per 1000 c.ft." in section 31 (further conditions as to charges by Corporation of Mossley) of the Stalybridge and Mossley Gas Act, 1885. (Dec. 1.)

Aldershot Ratepayers' Association.

At a meeting of this Association last week, Mr. C. J. Harland said that the town owed a debt of gratitude to Alderman Ainger (the late Mayor and Chairman of the Aldershot Gas, Water, and District Lighting Company) for settling their differences amicably. Now the Gas Company were not only able to work with goodwill, as one of the biggest ratepayers, but the town would have a much better advantage from the undertaking, because the Company would not be afraid to develop, and the town would offer them the facilities they needed for carrying on what was a very necessary and very prosperous industry, which the town was glad to have in its midst. The "Aldershot News," reviewing this agreement, says: "There is much hope for the future in the new atmosphere of cordial co-operation that has arisen between the Council and the Gas and Water Company, following their agreement on points of difference that have caused so much bitterness and expense in the past. That agreement has been reached by sheer goodwill and determination to do the right thing in the interests of the whole community. It has not been easy to arrive at, for much unworthy suspicion and unnecessary animosity had to be overcome. But the determination to overcome these succeeded, and a sad chapter in the history of the town was brought to an end, to the special credit of the then Mayor, Alderman H. Ainger, J.P., and the head of Aldershot's largest commercial concern, Mr. R. W. Edwards. To these the residents of Aldershot can never be sufficiently grateful for their efforts to overcome difficulties."

LONDON COUNTY COUNCIL HOUSING SCHEME.

Gas v. Electricity.

On Nov. 19 the Housing Committee of the London County Council, in their report, recommended the Council to accept the offer of the Wandsworth, Wimbledon, and Epsom District Gas Company to instal a gas supply, with a cooking stove, in each dwelling of the East Hill Estate, Wandsworth, which comprises 535 tenements. The Council would not be charged with installation costs, provided the Company were free to fix two gas points, which could be used by the tenant, if desired, for lighting purposes—the gas to be supplied through prepayment meters at the current rate for the district. For general lighting, however, the Committee considered it desirable that arrangements should be made for the supply of electricity. The County of London Electric Supply Company, Ltd., it was stated, were prepared to make the requisite extensions to mains, and to carry on the necessary services free of costs to the Council, subject to the whole of the tenements being wired for electric light at the cost of the Council. The Company would supply electricity in bulk; and it was proposed that the Council should undertake the distribution of the current and the collection of money from the slot meters. The charge for current would be 7·7d. per unit.

When these recommendations came before the Council on Dec. 2,

Mr. HERBERT MORRISON thought it was a matter for regret that the Housing Committee had not been able to make better arrangements with the Electricity Company. Much better terms could be obtained from any municipal undertaking. The price which the tenants would have to pay for electricity for lighting was 7·7d. In St. Pancras, he paid 4½d. (municipal undertaking); in Hackney it was 5½d.; in other boroughs 5d. and 4½d. The Company were most unenterprising in connection with the use of electricity for cooking. Separate installations for gas for cooking and for lighting were proposed, which to some extent meant duplicating the installation charges. The price of electricity was roughly 50 p.ct. more in the case of private electricity undertakings than in municipalities where they got electricity for all purposes, to the great advantage of everybody concerned.

Colonel LEVITA agreed it was regrettable that cooking by electricity did not find favour, and appeared to be more expensive than by gas. He did not desire to enter into debate as to gas *versus* electricity. They had placed in one tenement and had had in operation for a long period an electric installation both for lighting and for cooking, and the electric installation for cooking did not give satisfaction to the tenant. It might be that the particular class of tenant there was difficult to suit, it might be prejudice; but the fact remained that they did not like electricity for cooking, and they found it more expensive. For heating water, gas was found to be more economical and more satisfactory.

The Committee's recommendations were adopted.

GAS SUPPLY TO SMALL HOUSES IN BIRMINGHAM.

The question of embarking upon a large scheme for supplying gas for domestic purposes to small houses in the courts and alleys of Birmingham was discussed by the City Council on Tuesday of last week. It was raised on the following resolution:

> That, in view of the great desirability of securing for the poorer districts of the city the comforts and conveniences attached to domestic gas lighting and cooking, the Gas Committee be, and they are hereby, instructed to give special consideration to the extension of gas supplies for domestic purposes to small house property, including houses in courts, where such facilities do not now exist, reporting to the Council as early as practicable the action taken upon this instruction.

Miss WILSON, who moved the resolution, made strong appeal to the Council for support, though she knew it was a difficult subject, because they had no compulsory powers. Since the Council gave instructions in reference to the lighting of courts, they had lighted 2231 courts, and now that they had the gas up to the doors it seemed opportune to put the light into the houses. There were many houses in which oil lamps were used, and it would make a wonderful difference in these congested areas if gas were available.

Alderman J. H. LLOYD (the Chairman of the Gas Committee) said he was pleased to accept the resolution, which was only recommending what they were endeavouring to do as fast as they could. There had recently been greater activity in this matter than for many years past, and in the last twelve months they had been quite pressed to keep abreast of the influx of orders of this type. Some indication of the progress made might be gathered from the fact that during the past twelve months orders had been given for the installation of gas in about 1000 houses and tenements.

The resolution was carried unanimously.

Gas Lighting in Manchester.—At a meeting of the Manchester City Council on Wednesday last a discussion arose out of a decision of the Lighting Committee to proceed with the lighting of an important thoroughfare in the city by means of gas, as a result of which the Committee's recommendation was referred back.

New Plant at Windermere.—Referring on p. 673 of last week's "JOURNAL" to new plant being erected by the Whessoe Foundry and Engineering Company, Ltd., at the Windermere Gas-Works, it was stated that the Livesey washer and tower scrubber will be capable of dealing with a make of 20,000 c.ft. of gas per 24 hours. There was unfortunately a slip in connection with the capacity, which should have read 200,000 c.ft. of gas per 24 hours.

WANDSWORTH, WIMBLEDON, AND EPSOM DISTRICT GAS COMPANY.

Reduction of Standard Price Inquiry.

An application by the London County Council, under sub-section 3 of section 1 of the Gas Regulation Act, for a reduction of the standard price of the Wandsworth, Wimbledon, and Epsom District Gas Company, was inquired into by Mr. H. C. HONEY (Director of Gas Administration at the Board of Trade) at the offices of the Board, Great George Street, Westminster, on Monday, Dec. 1. It followed corresponding applications made by the Council, and dealt with by Mr. Honey, in November, 1923, and March, 1924 in respect of the standard prices of the Gas Light and Coke Company and the Commercial Gas Company. These were reported in the "JOURNAL" at the time.

As on the previous occasions, there was no dispute as to the necessity for a reduction of the standard price; the whole point was the amount of the reduction. Consequently the proceedings, for the most part, consisted of an examination of the estimates put forward by each side in order to arrive at what the new standard price should be, as well as the principles on which those estimates were based.

The Council were represented by Mr. F. N. KEEN (instructed by Mr. Martyn Hooke, Parliamentary Officer of the Council), and the Company by Mr. W. E. TYLDESLEY JONES, K.C., and Mr. JACQUES ABADY. There were also present Mr. Harry Jones (Chairman of the Company) and Mr. A. J. Lees (Messrs. Lees & Co., Parliamentary Agents). The Wimbledon Borough Council were represented by Mr. ALBERT E. SMITH (Town Clerk), and the Mitcham Urban District Council by Mr. STEPHEN CHART (Clerk to the Council).

THE COUNCIL'S CASE.

Mr. KEEN, opening the case for the Council, discussed the position of the Company under the existing Acts. The present Company was formed under the Wandsworth, Wimbledon, and Epsom District Gas Act of 1912, and was an amalgamation of three Companies—the Wandsworth and Putney Gas Light and Coke Company, the Mitcham and Wimbledon District Gas Light Company, and the Epsom and Ewell Gas Company. The limits of supply of the three Companies were kept separate, however, to the extent that they were defined, and were known as the Wandsworth limits, the Wimbledon limits, and the Epsom limits. The Wandsworth limits were entirely in the County of London and in the Metropolitan Borough of Wandsworth. The other limits were in the County of Surrey, except that a portion of the Wimbledon limits described in the Act as being in the County of Surrey is now in the County of London.

The standard prices set out in the 1912 Act were 4s. per 1000 c.ft. in the Wandsworth and Epsom limits, and 3s. 2d. in the Wimbledon limits. They were the standard prices of the old Companies. The equivalent prices per therm, on the basis of a 500 B.Th.U. gas, would be 9·6d. in the Wandsworth and Epsom limits and 7·6d. in the Wimbledon limits. There was a sliding scale operating in respect of each half-year. In the Wandsworth limits, for every penny or part of a penny above or below the standard price, the slide was 1s. 3d. on every £100 of Wandsworth "A" and "B" stock, carrying 5 p.ct., and 10½d. on every £100 of "C" stock, carrying 3½ p.ct., and on certain unallocated capital authorized by the 1912 Act. In the Wimbledon limits the slide was 1s. 3d. on every £100 of Wimbledon stock, and in the Epsom limits it was 1s. 3d. on every £100 of Epsom stock. There was a proviso dictating certain proportions between the actual prices charged in the three limits, but this was repealed by the Company's Act of 1921. As to the prepayment meter charges under the 1912 Act, the maximum for meter and fittings was 10d. extra per 1000 c.ft., and for a meter without fittings it was 10 p.ct. per annum on the cost of the meter. From the date of the amalgamation, Jan. 1, 1913, the standard calorific value was to be 136 calories, equivalent to 542 B.Th.U., but there was to be no liability if the supply were not less than 122 calories, equivalent to 485 B.Th.U.

In May, 1921, the Company obtained a Therm Order, under which the standard prices were fixed at 16·6d. per therm in the Wandsworth and Epsom limits, and 14·6d. per therm in the Wimbledon limits, in place of the previous 9·6d. and 7·6d. equivalents respectively—an increase of 7d. per therm. The prepayment meter charges were also re-defined. For a meter and fittings including cooker, the maximum additional charge was 3·6d. per therm; for a meter and fittings not including cooker, it was 3d. per therm; and for a meter without fittings, it was 1·8d. per therm or 10 p.ct. per annum on the cost of the meter, whichever should be the higher. The Company had obtained an Act in the same year (1921), and in this it was stated that, owing to the increase in cost of production, the arrangement in the 1912 Act as to the proportion between the prices in the different limits operated harshly on the consumers, and it was repealed. The arrangement substituted was that the actual price in the Wimbledon limits was not to exceed by more than 1d. per therm, and in the Epsom limits 2·2d. per therm, the price charged in the Wandsworth limits; and if any increase or decrease were necessary in the price of gas, it should be the same throughout the whole of the limits. It was also provided that if the actual costs of production and supply in the Wimbledon limits were not as much as 1d., or in the Epsom limits not as much as 2·2d., in excess of the cost of production and supply in the Wandsworth limits, the Board of Trade could authorize such a decrease in the prices charged in the Wimbledon and Epsom limits as would make them not more than the actual amount of the excess in the cost of production and supply.

Mr. TYLDESLEY JONES said this was only in the event of the Company making an application to the Board of Trade.

Mr. KEEN, coming to the present application for the reduction of the standard prices laid down by the Company's Order of 1921, said that when those prices were fixed figures of cost of production in 1920 were given. The circumstances then were very abnormal, and he commented upon the instability of the prices of coal, residuals,

and wages, and on the fact that a great deal of repair and renewal was waiting to be done, which rendered estimates unreliable. After stating the view that at that and other inquiries which took place about 1921 it was recognized on all hands that a revision of the prices then fixed might be necessary at a comparatively early date, he contended that at present the position was very much nearer stabilization. Dealing broadly with the evidence which was to be given by Mr. Arthur Valon, to show what was a fair normal estimate of the cost of production of gas at present, he said Mr. Valon had taken the cost of supply now as being 34·75d. per 1000 c.ft. At 475 B.Th.U., which was almost exactly the figure for the year to Dec. 31, 1923, this was equivalent to 7·32d. per therm. The pre-war cost, for the year to June, 1914, was 20·06d. per 1000 c.ft.; but, having made certain adjustments to this figure which it was felt in fairness ought to be made for purposes of comparison, the figure taken was 20·12d., which, at 500 B.Th.U. (the figure for the year to June, 1914), was equivalent to 4·02d. per therm. If this were deducted from the 7·32d., it gave an estimated increase over pre-war costs of 3·30d. per therm. In 1921 the Board of Trade had accepted 7d. per therm as being the increase in cost of production over the pre-war period; so that the Council now put forward a decrease since 1921 of 3·70d. Thus, they asked for a new standard price of 12·90d., in place of the existing 16·6d. per therm. Any savings effected through circumstances within the control of the Company had not been taken into account in these figures. Mr. Valon had not had access to the Company's works, and was unable to get information on which to form a clear estimate of those savings—if there were such. If the Company could prove these savings, they could, of course, take advantage of them in arriving at the new standard price. With regard to the relation to each other of the prices to be charged in the three limits, as laid down in the 1921 Order, the Council did not wish to depart from this principle, and he did not think the Company did.

Mr. HONEY remarked that he did not think the Board of Trade would either.

Mr. KEEN (continuing) said that, as to the reasonableness of the estimates to be put forward by the Council, there was strong confirmation of this in the actual reduction of price made by the Company as from Jan. 1 last. The average price during 1923 was 8·7d. per therm, and the price from Jan. 1 last was 7·8d.—*i.e.*, a reduction of 0·9d. per therm. The actual cost in the year 1923, deducting bad debts and capital duty—which Mr. Valon would say ought not to be taken into consideration, because bad debts should be a reduction from the receipt side, and capital duty was a proper charge against capital, and not revenue—as shown by the accounts, was 37·22d. per 1000 c.ft. This, at 475 B.Th.U., was 7·84d. per therm. If they deducted the drop in cost which seemed to be adumbrated by the reduction in the price—namely, 0·9d.—they arrived at 6·94d. per therm. This compared with the pre-war cost, which the Council put at 4·02d. per therm, constituted an increase of 2·92d. If this were added to the pre-war standard of 9·6d., it would give 12·52d. as the new standard price, as compared with the 12·9d. the Council asked for. He ventured to suggest that this was evidence of the moderation of the Council. It was very unlikely, of course, that the Company would drop the price to a figure which was not justified by what they thought was likely to prove the normal cost, and his submission was that this showed very strongly that the view of the Company must have been that it was not very likely the drop in the cost of gas would be less than the 0·9d. by which they had reduced it.

PRESENT COST OF PRODUCTION.

Mr. *Arthur Valon* (Consulting Engineer) then gave evidence, and showed how he had endeavoured to arrive at what was a reasonable normal cost of supply of gas at the present time. He had started on the basis of the published accounts of the Company for 1923, the last complete year for which accounts were available; and where the conditions seemed to be different from what they were in 1923, he had made what adjustments he had deemed necessary. After expressing appreciation of the Company's action in giving him information with regard to the present prices realized for residuals and other matters, which he could not get from the published accounts, he handed in a table showing detailed estimates of the present cost of supply. This showed that the gas sold in 1923 was 3,007,970 thousand c.ft. (1d. = £12,533), the declared calorific value was 470 B.Th.U., and the average calorific value supplied was 474·75 B.Th.U. The total expenditure, including interest, incurred in supplying gas at present, based on the sales and the calorific value in 1923, would be £435,597, which represented 34·75d. per 1000 c.ft. In the case of some of the items, in connection with which the existing conditions were substantially the same as those prevailing in 1923, he had taken the 1923 basis; but in other cases, where the conditions were substantially different, he had adopted another basis. For instance, in regard to the price received for tar, he regarded 1923 as an exceptional year, and said that the conditions might not be repeated for some time. The price had been lower this year, but, within the last month, it had commenced to rise again. It looked as though the average price in 1922 and 1924 would be about the same; and, therefore, he had adopted the average price realized in 1922—namely, 4½d. per gallon—in arriving at the total receipts for tar. The average price of tar in the provinces, given in the "GAS JOURNAL," for 1922, was 46s. 8d. per ton, and in 1924, up to date, it had been 46s. 4d. per ton. The prices received in London would be higher. In other cases, such as repairs and maintenance, he had taken the average pre-war figure, and had arrived at the present estimated figure on the basis that costs were now 80 p.ct. above pre-war costs. That was the figure he had adopted consistently at inquiries of this kind. In connection with repairs to stoves, he said that at present there were more stoves in use in proportion to the output of gas than was the case in 1914. In consequence of this, there would be a higher cost per 1000 c.ft. for the maintenance of stoves; and he had allowed for this in arriving at his estimate, which was 3·77d. per 1000 c.ft.

Witness then handed in a series of tables, and we reproduce one giving details of his estimate of what the new standard price should be.

Mr. Valon's Estimate of Standard Price.

	d.	Pence per Therm.	Pence per Therm.
Estimate of Present Cost of Supply—			
34·75d. per 1000 c.ft. at 475 B.Th.U.			7·32
Pre-War Cost of Supply—			
Year to June, 1914		20 06	
Adjust for repairs, &c., of works—			
Allow average	4·59		
Year to June, 1914	4·11		
Difference		0·48	
		20·54	
Deduct—			
Bad debts	£494		
Capital duty	3832		
	£4326	0·42	
At 500 B.Th.U.		20·12	4·02
Increase in cost over pre-war			3·30
Standard Price—			
Fixed by Board of Trade in 1921		16·6	
Pre-war standard price		9·6	
Increase in cost of supply under Gas Regulation Act, as found by Board of Trade			7·00
Fall in cost of supply			3·70
Existing standard price			16·60
New standard price			12·90

Commenting on the drop in price of 0·9d. per therm, as shown in the second table, Mr. Valon said he did not believe the Company would have reduced the price in that way unless they had expected, looking forward generally, they would be able to keep the price at that level. His estimate of the standard price, on the 1923 accounts, being 12·52d. per therm, as against the figure of 12·9d. per therm which he asked for, showed that he had been rather more generous to the Company than they were to themselves

Mr. TYLDESLEY JONES then cross-examined witness on behalf of the Company. There was agreement, more or less, with regard to many of the figures, and Counsel confined himself to those which were disputed by the Company. As to the net cost of coal, he put forward the view that this was higher at present than in 1923, largely owing to the abnormal fall in the prices of residuals. Mr. Valon agreed that there had been a substantial fall in the price of tar, and that there had been a drop in the price of ammonia. He agreed that nobody had expected the big drop which had taken place in the price of tar. It was probable, as suggested by Counsel, that the tar market had been affected seriously by the re-opening of the Ruhr mines. Counsel then referred to the difficulty, which Mr. Valon himself had mentioned, of arriving at an estimate of the revenue received from various residuals, owing to fluctuations which nobody could foresee. In his estimate of the present cost of supply, Mr. Valon had given the revenue from residuals as £201,923, and Counsel suggested that he could not be certain that this was the right figure within 5 p.ct. Witness agreed that he could probably not get within 5 p.ct. on every item; but if some of the items were down 5 p.ct., others would certainly be up 5 p.ct., and he had arrived at his figures fairly.

The net cost of coal was given by Mr. Valon as 9·18d. per 1000 c.ft., and the Company's figure was 9·4d. Counsel suggested that, having regard to the various considerations which had to be borne in mind, some local and some otherwise, Mr. Valon could not be certain of his estimate to within 0·22d. As to water gas manufacture, Mr. Valon's figure was 2·72d. per 1000 c.ft., and the Company's 2·9d., a difference of 0·18d. For repairs and maintenance of works and plant, Mr. Valon's cost was 8·63d. per 1000 c.ft., and the Company's figure was 9·01d. They had both adopted the view that the 1914 figure required some adjustment. Mr. Valon had taken an average figure, and the Company had made an adjustment which brought them a little above the average. Mr. Valon had assumed the increase in cost to be 88 p.ct. above pre-war, whereas the Company had assumed it to be 95½ p.ct. With regard to cost of labour on works, the Company had taken an increase of 96 p.ct., and Mr. Valon 82 p.ct. The higher figure given by the Company was in spite of the fact that they had, by effecting improvements, dispensed with some labour, and thus brought about savings. If the Company had, in fact, saved labour by spending capital and making additions to works, this affected the comparison which Mr. Valon had sought to make between the labour bill of one year and that of another. Witness, however, would not agree that his figure of 82 p.ct. was too low.

Counsel then directed attention to Mr. Valon's general figure of 80 p.ct., as being the percentage increase of present costs over pre-war, and ascertained that Mr. Valon had given this figure consistently for about two years. He suggested that there had been an increase in prices recently, which should have the effect of increasing the percentage. Mr. Valon would not agree. The price of some items had gone up, and that of others had gone down, and he would still say that 80 p.ct. was as near as they could get to a practical average figure.

With regard to repairs of mains and services, Counsel said that if Mr. Valon had taken the average for the three pre-war years, as he had done in the case of repairs and maintenance of works, he would have obtained a higher figure than the one he had given, which was the 1914 figure. Mr. Valon agreed, but pointed out that two of those years were abnormal, and also that 1914 was the first complete year in which the three Companies were amalgamated.

It was pointed out by Counsel that the sizes of mains had to be increased, in order to supply gas at the pressure demanded by the Gas Regulation Act; but Mr. Valon said that this depended on the number of consumers on the mains. Also, in his experience, the

alteration to 2 in. had made practically no difference to the pressure actually given by up-to-date gas undertakings. He did not know of any decently-managed company who gave a pressure of less than 2 in. He agreed that, if it were necessary to substitute larger mains for the present ones in order to maintain the necessary pressure, the cost would be a proper charge to revenue—a temporary charge for the period during which the work was being done.

Counsel suggested that, if the Company had to increase the size of mains in the next three, four, or five years, as they had been doing in the last two years, and it was a proper charge against revenue, it was a proper item to include in the figures when arriving at a standard price. Mr. Valon had not allowed for this in his figures. Witness replied that, if they had an expenditure lasting one, two, or three years, it was not fair to take it as a proper charge for fixing the standard, which would last for a number of years. Counsel pointed out that the standard could be revised at any time.

As to the number of automatic meters, Mr. Valon admitted that it should be 46,680, instead of 44,149, as given in his tables. With regard to his estimate of the standard price, Counsel asked why he had assumed, in arriving at the pre-war cost of supply, that the calorific value was 500 B.Th.U. Mr. Valon replied that it was because the Company had said this was the average value of the gas supplied in 1914. Counsel pointed out that, at the inquiry before Mr. Honey in 1921, in connection with the Company's Order, it was shown that this was a mistake, and that the calorific value was 540 B.Th.U. Everybody had agreed, but the Company were unable to get the benefit of it, merely because, owing to the mistake, they had asked for a standard price which was lower than it should have been, and the Board of Trade had not the power to give a higher price than was asked for. Therefore, on the basis of a calorific value of 540 B.Th.U., Mr. Valon's figure of 4·02d. per therm, as being the pre-war cost of supply, would be 3·73d.; and, if that were deducted from the estimate of the present cost of supply—namely, 7·32d.—the increase of present costs over pre-war would be 3·59d., instead of 3·28d. Witness agreed to this. Counsel said that the standard price fixed by the Board of Trade in 1921 was 16·6d. per therm, and the pre-war standard was equivalent to 9·6d. per therm, and he asked Mr. Valon how he arrived at the pre-war standard. Witness said he had taken the pre-war standard in thousands of c.ft. and divided by 500.

Mr. TYLDESLEY JONES said this matter was also discussed in 1921, in the cases of this Company, the Gas Light and Coke Company, and the Brentford Company. The question was as to what was the proper standard to take when there was a penalty point for calorific value, and the Board of Trade had decided in those cases that the proper calorific value to take was that of the penalty point. This was another mistake made by the Company in 1921, and again they could not get the benefit, because the Board of Trade were unable to give a higher standard price than they had been asked for. The penalty point was 122 calories—*i.e.*, 484 B.Th.U. Therefore, if they divided the pre-war standard of 4s. per 1000 c.ft. by 4·84, they obtained a figure of 9·92d. per therm, against Mr. Valon's 9·6d. If he added the pre-war standard of 9·92d. per therm to the increase in cost over pre-war of 3·59d. per therm (as admitted by Mr. Valon), he got a new standard price, on Mr. Valon's own basis, of 13·51d. per therm. This included nothing for savings effected through circumstances within the control of the Company.

Witness held the view that, by taking the penalty point figure when they were actually supplying something higher, the Company were getting something they were not entitled to.

There was nothing between the parties as to the advantages which should accrue to the Company as the result of savings effected. Counsel said that a great deal had been done in the way of reducing costs by improved methods; and he asked if Mr. Valon would be surprised to find that they had been able to effect economies amounting to nearly ½d. per therm. Witness, however, said he could not give a figure, though he knew the Company had effected improvements.

This concluded the case for the London County Council.

Mr. HONEY mentioned that the two Local Authorities concerned—namely, Mitcham and Wimbledon—did not propose to appear separately at the inquiry.

THE CASE FOR THE COMPANY.

Mr. TYLDESLEY JONES, opening the case for the Company, said the point between the parties had been reduced to a very small compass, because the Company did not dispute for a moment that, owing to the fall in costs since 1921, there ought to be a revision of the standard price. The only question was the amount. Briefly reviewing the circumstances, Counsel recalled that in 1921 an application was made by the Company under the Gas Regulation Act of 1920 for a therm price, and on that occasion the usual statement showing the figures for the year 1912-13-14, giving an average for the three pre-war years, together with the figures for the years 1919 and 1920, was placed before the Board of Trade. As was pointed out to the Director at the time, there were various mistakes in the basis upon which these figures were presented; but the application having been made for a particular standard price, the Director was unable to go beyond that and take into account the mistakes that had been made by the Company against themselves. The first and most important mistake in the basis upon which the original therm price was estimated was in taking the calorific value of the gas before the war as 500 B.Th.U. when, as was shown by the official test figures, the figure should have been 540 B.Th.U. The Company in 1921 received sanction to the full figure asked for as a standard therm price; and he referred to this because, though the methods which the London County Council had adopted in the present instance might be perfectly right in other cases, it was not the proper method to adopt in the present case. As a matter of fact, the Company unfortunately made two mistakes against themselves in 1921, consideration of which would have justified a substantially higher figure than that which the Board of Trade granted. In the first place 540 B.Th.U. should have been taken as the standard calorific value; in the second place the standard should have been converted at the penalty point—this had been settled on at least three occasions; twice by the Board of Trade, in the Brentford and Gas Light and Coke Companies' cases, and once by Parliament in the case of the Gas Light and Coke Company's Bill in 1914. He agreed with Mr. Valon that to arrive at the right pre-war cost they should take the 1914 figures and make an adjustment in respect of those repairs, which were low for that year compared with the average for the three previous years. He would even go further than this, and by his witness, Mr. Evetts, would tell the Director that the figure in 1914 for mains and services also required a slight adjustment by way of an increase. According to Mr. Valon the cost of supply to-day was 34·75d., whereas the Company made the figure 37·70d., or roughly 3d. higher. This arose partly from the difference of opinion as to the net cost of coal—though there was not a great difference—and more largely owing to a difference of opinion as to the cost of repairs. Mr. Valon had informed the Director that he had been urging the same policy for two years, and it was sometimes said that what had been stated three times must be the truth. This, however, could only apply if none of the factors had changed in the meantime; and the factors certainly had changed in this case.

The only other point he wished to refer to was in connection with the savings which the Company had effected outside the fall in cost of labour and materials, &c. If it could be shown that savings had been effected by capital expenditure since 1914, then the Company were entitled to have them added to the standard price, because working costs were being replaced by interest on capital. The evidence would show that savings in this way amounted to 0·44d. per therm; and if that were right, and making the proper adjustment to substitute 540 B.Th.U. gas for 500 B.Th.U., and converting at the pre-war standard on the proper basis—namely, 484 B.Th.U.—on Mr. Valon's own figures he arrived at 13·51d. as the proper standard, to which must be added 0·44d. for savings made by capital expenditure, making a total of 13·95d. The Company's figures without savings came to 13·97d., and with savings by capital expenditure 14·41d., so that it was only a difference of 0·34d. between them. Perhaps there could be no better evidence of the fairness of both engineers who had gone into this than that they should have come together so closely as this, when the allowance was made for the matters to which he had referred. With regard to Mr. Valon's suggestion that the action of the Company in reducing the price since the last inquiry had justified his estimate of the likely position, Counsel said that it was not a permissible thing to put forward such an argument, because those responsible for the policy of the Company may have been—and the facts seemed to justify it—unduly optimistic, and had reduced the price hoping for an improvement in the returns from residuals. This had not come about, and at the moment the Company were actually losing money and drawing upon their reserves to maintain dividends. As a matter of fact, Mr. Evetts would say in evidence that the costs for the whole of 1921 were actually higher than the estimated figures which he placed before the Board of Trade in the earlier part of the year when the 1921 inquiry was held. On the other hand, Mr. Valon had suggested that Mr. Evetts' estimates were too high.

MANUFACTURING COSTS AND STANDARD PRICE.

Mr. *George Evetts* then gave evidence for the Company, and handed in a series of tables dealing with the costs of manufacture, and his calculation of the new standard price which should be granted. The following table is a summary of these calculations.

He pointed out that, whereas in 1921 his estimated cost for that year was 57·39d., the actual figure at the end of the year was found to be 59d. per 1000 c.ft., though the repairs were lower than the estimate by 2d., the reason being that the Company simply could not afford the repairs estimated owing to the tremendous increase in costs in other directions. Moreover, the pre-war dividend was not reached by the Company until the second half of 1922. The Company were longer than any other in South London in reaching the pre-war dividend.

Dealing with the difference in quantity of breeze put down for the current estimate as compared with last year, witness explained that last year there was an accumulation of breeze and clinker which was sold-off in large quantities ata low price; but this had been partly cleared away, though there was a large quantity still to be sold. Actually, however, during the current year the quantity of real breeze would be less, and this was why he had taken 33,323 tons at 7s. 6d., as against 46,755 tons at 7s. 3d. in 1923. The higher price for coke—namely, 27s. 6d., against 27s. 2d.—was based on the receipts of the past three months, though actually at the moment the receipts were slightly less. In regard to tar he had taken the figure of 3¾d. per gallon against Mr. Valon's 4¼d.; and that, again, was based on the actual position, because a large quantity of tar was sold by the Company on sliding-scale contracts which brought the price down to a very low figure. As a matter of fact, the Company were taking steps to avoid having to sell surplus tar at these low prices, and it was hoped that, by increasing the storage and dehydrating more tar, it would be possible to keep it in stock until the spring, when prices always improved. In this way an increase in revenue from tar of £2500 to £3000 a year was anticipated, but had not been taken account of in his figures; and there should be a reduction of 0·05d. per therm on this account. With regard to sulphate of ammonia his figure was less than Mr. Valon's, and was based upon actual prices received. Another difference was in the price of oil for the water gas plant—viz., 5⅜d. per gallon, against Mr. Valon's 5d.—his own figure being that which was actually being paid. Coke and breeze used on the works were charged at the same price as in the gross receipts, and in this way the total cost of materials came to £154,067 for the current estimate, against Mr. Valon's £149,000.

Dealing with wages, Mr. Evetts pointed out that, while it was true that the balance-sheet only showed an increase all round of 82 p.ct. over pre-war, the actual rates being paid to most grades were much more than this, and the lower figure in the balance-sheet merely indicated that the Company had economized in the total labour costs. As an instance, he mentioned that stokers' wage rates were actually up by 116 p.ct. As for repairs and maintenance, it was agreed that the figure for this in 1914 was low, though the average figure for

Cost in year to June, 1914 .	20·06d.			
Adjustments—*add* repairs .	1·40d.			
	21·46d.			
Less non-recurring expenditure capital duty £3832 . .	0·37d.			
	21·09d. Calorific value supplied 540 B.Th.U. = 3·90d. per therm			
	Present Costs.		Pence per 1000 C.Ft.	
Coal	£313,457			25·01
Less residuals	195,678			15·61
Net coal	£177,779			9·40
Oil, coke, &c., for water gas.	36,288			2·90
Net materials	£154,067			12·30
Wages as £36,230			2·89	
Salaries 1923 £12,315	48,545		0·98	3·87
Purifying	9,390			0·75
Repair and maintenance of plant	112,922			9·01
Distribution wages and salaries £24,966			1·99	
Add 6,250	31,216		0·50	2·49
Repair and maintenance of mains	63,166			5·04
Repair and maintenance of meters £19,816	Cr.		1·58	
Less receipts 49,315	29,499		3·93	Cr. 2·35
Repair and maintenance of stoves £46,760			3·73	
Less receipts 60,742	Cr.	13,982	4·85	Cr. 1·12
Repair and maintenance of automatic fittings . . . £9,475			0·76	
Less receipts 17,293	Cr.	7,818	1·38	Cr. 0·62
Maintenance of incandescent burners £8,363			0·67	
Less receipts 6,388	1,975		0·51	0·16
Rents, rates, and taxes . . £19,194			1·53	
Less receipts 1,046	18,148		0·08	1·45
Management (as 1923)	32,013			2·56
Law and Parliamentary (average 3 years). .	1,102			0 09
Co-partnership (as 1923)	16,353			1·30
All others (1923) Ex. capital duty	16,921			1 34
Interest on debentures and temporary loans.	18,674			1·49
Total cost of manufacture and supply. . .	£473,193			37·76
Present cost of gas	$\frac{37·76d.}{4\ 75}$ = 7·95d. per therm.			
Cost in 1913-14	3·90d.	,,		
Increase in cost since 1914	4·05d.	,,		
	Pre-War Standard Price on 484 B.Th.U. Basis.			
Wandsworth and Epsom = 4s. 0d.	9·92d.	,,		
Mitcham . . . . . = 3s. 2d.	7·85d.	,,		
	New Standard ex Savings.			
Wandsworth and Epsom	13·97d.	,,		
Mitcham	11·90d.	,,		
Amount of savings	0·44d.	,,		
New standard, taking account of savings—				
Wandsworth and Epsom	14·41d.	reduced to 12·3d. and 12·29d. respectively.*		
Mitcham	12 34d.			

* See end of Mr. Evetts' evidence.

the three pre-war years contained some abnormal expenditure, due to coupling-up mains which had to be laid immediately before and immediately after the amalgamation with the Mitcham Company, authorized in 1912. A sum of £14,000 was spent in that connection, but the figure he had taken showed an increase of 93 p.ct. over what he called the basic pre-war year, for which he had adopted 10·43d. per 1000 c.ft. for repairs and maintenance, as against 9·03d. actually spent in 1914. This figure of 93 p.ct. applied to works, mains and services, meters, stoves, and prepayment installations. Incidentally Mr. Evetts mentioned that Mitcham would always be a dearer district to maintain as regards mains and services than Wandsworth, because it consisted so largely of fully-developed streets in which some 20 to 24 miles of 3-in. mains would have to be converted to 4 in. or 6 in. in the near future, in order to maintain the pressure. There was not much prospect of many new consumers coming on to offset this extra cost of new mains. This work of conversion of 3 in. to 6 in. mains had already been commenced, and an average figure of £1100 per mile would have to be spent. About four miles had been completed, and he considered that the figure of 5·04d. for mains and services, which he estimated, was reasonable. As to the difference between his figures and Mr. Valon's for meters, all he could say was that his were based upon actual experience of the Company's working.

Coming to the question of savings effected by capital expenditure, witness emphasized the point that the Company have installed telpher plant in No. 2 retort house at Wandsworth, while in No. 4 retort house new coal-handling arrangements were being installed in the way of new inclined conveyors and hoppers, with corresponding alterations for coke handling at Mitcham, and to some extent at Wandsworth. The savings on this account were 0·29d. per 1000 c.ft. Savings had also been effected in regard to coal shipping and transport. One of the Company's boats had been sunk during the war, and it had been replaced by a larger and more expensive one. Another had been sold and replaced by a larger one. In addition, a new pontoon had been installed in the river, to facilitate the unloading of the boats. All the new ships were made self-trimming. New cranes and newer and larger types of barges had been purchased and installed, so that the barges could unload the larger steamers on one tide. The savings on this account represented 1·37d. per 1000 c.ft. Then in the matter of transport costs, savings had been effected in the cartage by road between Mitcham and Epsom to the extent of 0·42d. per 1000 c.ft., making total savings under these heads of 2·08d. per 1000 c.ft. The saving in transport would have been greater but for the fact that, when their lorries were doing five journeys a day between Wandsworth and Epsom, they maintained such a speed that the police intervened, and the number of journeys had to be cut down to four per day. Reverting again to the table given in detail, Mr. Evetts pointed out that his total figure of 14·41d. as the new standard price for Wandsworth and Epsom would be reduced to 14·36d. when the 0·05d. per therm, due to the alteration in the tar estimates, was deducted; and his figure of 12·34d. for Mitcham would in the same way become 12·29d. as the new standard price.

Mr. KEEN cross-examined first on the question of the price of coal estimated by Mr. Evetts—namely, 31s. 0½d. per ton—and suggested that coal was lower than that now.

Witness explained that this figure was the actual figure for the existing contracts for the current year, although he agreed that small purchases could be made now at a somewhat lower price. On the whole, however, he doubted whether it would be possible to obtain a twelve months' contract for a large quantity of coal at a much lower figure than that now being paid by the Company.

Dealing with tar, Mr. Evetts would not, though pressed, accept Mr. Valon's figure of 4½d. per gallon as receipts during the year, having in view the fact that for the first six months of this year the revenue from tar was substantially lower than that. Moreover, during 1923, tar fetched a fictitious price, owing to the large demand in France for the purpose of making patent fuels. Even early in 1924 it reached 8d. per gallon. Nevertheless, he had made the deduction of 0·05d. per therm in respect of the improved price likely to be obtained in the spring as the result of the new methods of handling which he had mentioned; and in this way the net coal cost shown in the table of 9·4d. per 1000 c.ft. would be reduced to 9·15d., as against Mr. Valon's estimate of 9·18d. per 1000 c.ft.

Mr. TYLDESLEY JONES (to Mr. Keen): Why take one figure in the total cost of coal, when the London County Council's net figure is higher than ours?

Mr. KEEN: If you will agree to our figure, I will leave it.

Mr. TYLDESLEY JONES: Certainly I will. We have already agreed to reduce our estimate to below your figure; and therefore I shall be only too pleased to accept your figure.

Mr. KEEN: I did not appreciate that that had been done.

Mr. HONEY: I understood it to be so half-an-hour ago.

It was therefore agreed to accept the London County Council's estimate of 9·18d. per 1000 c.ft. as the estimated net coal cost for the current year.

Witness, answering questions by Mr. KEEN as to whether there had been any change in cost of repairs during the last two years, said his experience was that there had not been a great deal of alteration, some items having gone up, and others down. At the moment certain things such as steel were very low. As regards meters, though these were up by not more than 65 p.ct. at present, there was little doubt that for this money users were not getting the same article as pre-war. It was difficult, of course, to put a figure upon this aspect in assessing the present costs, because experience had not been long enough to estimate how it would affect costs eventually. Generally speaking, the tendency would be to increase costs, by reason of the meters not lasting so long. At the same time the Wandsworth Company were not adopting the false policy of buying meters and stoves to-day at the low price in advance of pre-war at which some makers were selling. The price paid for ordinary meters was 70 p.ct. over pre-war, and 68 p.ct. for prepayment meters.

Counsel, dealing with the replacement of the 3 in. main by 4 in. and 6 in. mains, said that, as the Company were getting a larger main for the money, it was obvious that it would bring in more revenue, and this advantage to the Company must be taken into account in arriving at the net costs. Witness, on the other hand, said that as these mains were being laid in streets where there was little prospect of new connections, the whole of it should be considered as a capital charge, and the Company given the benefit of the improvement so effected.

Mr. KEEN, in his final remarks, urged the Board of Trade to adopt the same figure of calorific value in coming to their decision now as they adopted in 1921 at the previous inquiry. They were not acquainted with the precise manner in which the Board of Trade dealt with the position in 1921; but if the Board took a lower figure than 540 B.Th.U. then, the smaller figure should be taken now.

Mr. HONEY, at the conclusion of the inquiry, said the points of difference in actual figures between the experts engaged on either side were very small; and if it were only a question of deciding between them, it would not perhaps be so difficult. The other points that had been raised by Mr. Tyldesley Jones, however, rather complicated the matter; and it would be necessary for the Board to give serious consideration to all the matters that had been raised.

The inquiry then closed.

New Capital Issues.—Messrs. A. & W. Richards, of 37, Walbrook, E.C., have been instructed by the Directors of the Northfleet and Greenhithe Gas Company, Ltd., to offer for sale by tender £6600 6 p.ct. redeemable mortgage debentures; the minimum price of issue being par. Tenders should be sent to the firm at the above address not later than eleven o'clock on Friday, Dec. 19. The Directors of the Herne Bay Gas Company, Ltd., have instructed Messrs. Richards to offer for sale by tender 3000 £5 additional ordinary shares; the minimum price of issue being par. Tenders should be sent in not later than eleven o'clock on Thursday, Dec. 18. Notices of both these issues appear in our advertisement columns this week (p. 744).

ALDERSHOT GAS LANDS INQUIRY.

Mr. H. C. HONEY (Director of Gas Administration) held an inquiry at the Board of Trade Offices last Friday concerning a Draft Order promoted by the Aldershot Gas, Water, and District Lighting Company under section 10 of the Gas Regulation Act, 1920. The only object of the Order was to authorize the Company to acquire and use for gas storage purposes 1.13 acres of land adjoining the works, and opposition was offered to this by a property owner within the statutory 300 yards limit.

The Company were represented by Dr. C. F. BLYTH (of Messrs. Blyth, Dutton, Hartley, and Blyth), Mr. R. W. EDWARDS (the Managing-Director), Mr. A. V. BARRACLOUGH (the Engineer), and Mr. F. A. RICKETTS (the Secretary). The property owner, Mr. H. H. Giles, appeared in person.

Dr. BLYTH, giving a short account of the history of the Company, said it was formed in 1866 for the supply of gas and water within a certain area in the Aldershot district, but there had since been considerable additions to this area. As a matter of fact, the area now extended into the three counties of Hampshire, Surrey, and Berkshire. The water and electricity undertakings were only of interest in this inquiry to the extent that gas engines were used for both concerns. The original works, now the main works of the Company, were in Ash Road. The conditions under which the Company worked were special, in that their area was largely a military one, and included the North and South Camps, Rafborough, and other military establishments. The town only began to develop with the decision, after the Crimean War, to make Aldershot a military centre, and naturally there had been a large growth in the demand for gas. The war period, of course, brought a very great increase, and at one time the maximum output rose to as much as 2¾ million c.ft. per day, whereas the existing storage was only 700,000 c.ft. The Company had considered this matter just before the war, but it was then found impossible to get the work done. Up to 1923 gas was the only means of illumination in North Camp, but the War Office then decided to use electricity generated by their own plant, so that there was an immediate drop in the demands on the Company. Against this, however, the War Office permitted the Company to take certain steps to develop the use of gas for heating and cooking in the messes and institutes, and the increase of business resulting to some extent off-set the loss from the change to electricity in North Camp. In spite of the loss of lighting in North Camp, there was an increase in 1923 in sales of 0·4 p.ct. over 1922, when there might have been expected to be a decrease; and on the basis of the figures so far, it was calculated that there would be an increase of 10 p.ct. in 1924 over 1923. In 1923, there were connected 957 new consumers, and a total of 1400 new consumers was calculated for 1924. As further evidence of the increase going on in the Company's business, it was pointed out that in 1923 there were connected 268 cookers, 370 fires and radiators, and 75 hot water appliances. The corresponding figures for 1924 to date were 574 cookers, 484 fires and radiators, and 125 hot water equipments. As to electricity, in 1923 there were 678 consumers connected, and the output was 498,390 units; while in 1924 the number of consumers would have increased to 875, and the units generated to 705,000.

Reverting to the gas undertaking, Dr. Blyth said the maximum day's output now was about 2,000,000 c.ft., and as the storage capacity was but 700,000 c.ft., it would be seen how far short this fell of the two-thirds of the maximum day's output now adopted as the standard provision, though in earlier days a whole maximum day's output used to be taken. It was in these circumstances that the Company asked for power to acquire additional land and use it for storage purposes. This land adjoined the existing works. Though the Company took over the North Camp and Farnborough Company with works at North Camp, a good many years ago, it had been the considered policy of the Board to treat the Aldershot works as the main manufacturing station, and only to generate electricity and to store gas at the North Camp Works At the Aldershot Gas-Works in Ash Road, there were three holders—two of 120,000 c.ft. capacity each, and the third 350,000 c.ft. At the North Camp Works there was a 500,000 c.ft. holder, and at Pontal Bridge and Fleet there was a 40,000 c.ft. holder. The last named, however, was only used when the pressure in that district fell below 2½ in., and though the nominal storage capacity amounted to 1,130,000 c.ft., the effective total was only 700,000 c.ft., because Nos. 2 and 3 holders at the Ash Road Works were only effective as regards two-thirds of the capacity, and No. 1 holder was ineffective when boosting. Thus the question was a vital one for the Company. Speaking of the nature of the neighbourhood in which the Ash Road Works are situated, he pointed out that the local sewage farm surrounded the works on two sides, and that there was also a bone mill close by, together with an isolation hospital. The only opponent to the proposal was Mr. H. H. Giles, who was the owner of five houses, in one of which he lived, within the 300 yards' limit of the Gas-Works. At the present moment, Mr. Giles looked straight on to the purifying house of the Gas-Works through a gap in a row of small cottages which were in front of him; but it was the proposal of the Company to fill up this gap with similar cottages, and to that extent Mr. Giles's outlook would be improved. Four of Mr. Giles's houses were built long after the Gas-Works, while Mr. Giles's own bungalow was erected only last year.

Mr. EDWARDS formally confirmed what Dr. Blyth had said.

Mr. GILES, stating his objections to the proposal, said that in the first place the Company had a great deal of spare land farther away from his houses, which could be used for a holder. He believed the erection of a new holder on the land fronting his property would depreciate its value by one-third, and it would be an unsightly thing to have a holder 50 or 60 ft. high always in view.

Some discussion took place regarding the signatures which the Company had secured from tenants close by, including one of Mr. Giles's tenants.

Mr. GILES alleged that the Company's representative came round for these signatures on a Sunday morning, when people signed anything to get rid of him, because he was interfering with the preparation of the Sunday dinner; and, moreover, the position was misrepresented, because the people were told that it was only intended to remove an existing gasholder and put a new one in its place. When he made inquiries he found this was not the case, and he therefore refused to sign. Indeed, one man had gone to the Company's offices and demanded that his name should be removed from the list of signatures when he ascertained what was proposed.

Mr. HONEY said he feared people who signed the forms must take the consequences. Mr. Giles refused to sign, and therefore his case would be dealt with. He was absolutely satisfied, from looking at the plans and hearing the Company's evidence, that the proposed site was a suitable one for the purpose, apart from the questions raised by Mr. Giles regarding his property. The Company had given an undertaking to build further houses and fill-up the present gap, so that Mr. Giles's view would be protected to some extent. The point to be remembered was that Mr. Giles took a considerable risk in building his houses close to a gas-works, having regard to the fact that the district was bound to grow, and the gas-works might have to be enlarged on land adjoining the works which were there when Mr. Giles built his houses. On the whole, he really could not think that Mr. Giles had any reason to come forward and press his petition so far as to say that the Company should not put up a holder on this site.

During further discussion, it was ascertained that the works at present are about 300 ft. away from Mr. Giles's property, and that when the new holder is erected the nearest point may be 150 ft. away.

The inquiry then closed.

CO-PARTNERSHIP AT BRIGHTON.

Very satisfactory results were disclosed at the annual meeting of members of the Co-Partners' Sick and Benefit Fund in connection with the Brighton and Hove General Gas Company, at which Mr. A. M. PADDON (Chairman of the Company) presided.

The CHAIRMAN moved the adoption of the report for the year ended Sept. 30. This showed that the fund had a membership of 600—an increase of 105 on last year's figures. The balance had increased by £667, and now amounted to £1655. The 600 members comprised 360 of the Portslade employees and 240 of the distribution staff. Of the former 176, and of the latter 91, had received benefit—a total of 267. The amount paid out during the year was £2108. Members' contributions came to £1460, and the contribution of an equal amount from the Company brought the total receipts to £2921. The expenditure for the year was £2253. Regret was expressed at the death of Mr. J. T. Funnell, Joint Secretary of the Fund. The Committee drew attention to the fact that the expenditure had exceeded the contributions of the members by £793. The Committee had recommended the Trustees to invest a further £800 of the cash at bank. Mr. Paddon said his task was not a difficult one. They would agree with him that the fact that such a report could be presented after only two years' working of the co-partnership as a whole was a complete endorsement of the success of the scheme. Indeed, it seemed to him remarkable that they could have gone on so long as they did without that beneficent and efficient machinery for meeting sickness and kindred misfortune in regard to the employees of the Company. Of course the fund was the first child of co-partnership. Without co-partnership they would not have had it; with co-partnership they would get a great deal more. He would not have had the courage to propound a scheme of such dimensions but for the sound spirit of co-partnership which was in existence at the time of its inception. The first thing that struck him in the report was the comparatively large number of members who had received benefit. It amounted in the aggregate at Portslade to 49 p.ct. This showed the strength and stability of the fund.

Mr. C. H. RUTTER, the Engineer and General Manager, mentioned that the recommendation that a further £800 be invested had already been carried out.

The report was adopted.

Redhill Gas Company.

The annual meeting of the co-partners was held last week—Mr. G. R. Hunt, J.P. (Chairman of the Committee of Management), presiding. The report showed substantial progress during the past year; the bonus and interest credited for the period under review being at the rate of 5½ p.ct. The Chairman said that the total number of co-partners on the register was now 130; this being 15 more than last year. It was interesting to observe the growth of the figures in the report. The bonus and interest together had gone up since last year from £919 to £1067. The accumulated funds had risen during the twelve months from £3669 to £4953. The co-partnership funds had accumulated, as from the commencement of the scheme, to an amount very near to £5000. It was especially pleasing to note that no less than £565 of the total was accounted for by the savings deposits. Nine more co-partners had become stockholders during the year, and the stock held between them—122 in all—had advanced by £920, showing a total holding of £4765. Co-partners should hold very tightly to their stock in the Company; it was certainly getting more valuable. Gas stock in general now appeared to be gradually coming back to its pre-war price; while the business of the gas industry, and of their undertaking in particular, was extending and increasing considerably. The Trustees had a substantial balance of stock available to meet applications for transfers at any time.

The Blackburn Town Council have appointed a Committee to consider and report upon the question of installing gas or electricity for heating purposes in their municipal dwellings.

Darlington Gas Department.—The accounts for the year ended March 31 show a net profit of £4875. Of this sum £3500 has been allocated to the relief of rates, and £1375 has been placed to the gas-works reserve account. The total expenditure was £104,648, and the income £122,044. Sales of gas amounted to £81,722; and for residuals £34,996 was obtained.

Gas for the East Hill Estate, Wandsworth.—The Housing Committee of the London County Council have come to the conclusion that the Council should accept the offer of the Wandsworth, Wimbledon, and Epsom District Gas Company to instal a gas supply, with a cooking stove, in each tenement in the East Hill Estate, Wandsworth, which comprises 535 tenements.

"The Brightness of Leeds by Night."—This is the title of a short but interesting article in a Yorkshire evening paper, in which the writer makes the statement that, "with the possible exception of Paris, Leeds is by far the gayest and liveliest city I know to-day." This is, no doubt, in large measure due to the excellence of the street lighting, where a real attempt has been made to dispel depressing gloom.

Further Price Reduction at Hessle.—Consumers have been notified by Mr. R. B. Anderson, the Secretary of the Hessle Gas Company, of a "further reduction in price of heat." As from the end of this year the charge will be 10·2d. per therm within the urban district of Hessle or the parish of Anlaby, and 11·4d. per therm outside this area. As from March 31 next the calorific value of the gas will be raised from 475 to 500 B.Th.U.

South Barracas Gas Supply.—The report to be submitted at next Monday's meeting of the South Barracas (Buenos Ayres) Gas and Coke Company, Ltd., states that, with the debit balance brought forward, there was at Dec. 31 last a total debit of £181,976. During 1923 the Primitiva Gas Company of Buenos Aires continued to supply all the gas required by this Company, in accordance with the working agreement between the two Companies. The amount of gas sold in the year was 818,437 cub.m., which compares with 508,034 cub.m. during 1922. This increase was mainly due to the supply having been re-established in districts where it had been discontinued.

Canadian Gas Inspection Service.—The report for the year to March last of Mr. O. Higman, Director of Electricity and Gas Inspection Services of the Canadian Department of Trade and Commerce, gives particulars of the companies registered and of the tests undertaken of gas and meters. The number of meters in use in each case is stated. He says that the work of calibrating gas meters for capacity was continued in the laboratory, and further discrepancies in manufacturers' ratings discovered and corrected. The practical utility of the rating at half-inch differential was further demonstrated during the year by the finding of great differences in similar meters due to variation in size of valve.

The Chiswick Meter Works.—The annual dinner and smoking concert of the firm was held at Chiswick on Friday, Nov. 28. Following the loyal toast, Mr. R. V. Steed proposed "Success to the firm." They were to be congratulated, he thought, on the gathering, which numbered practically double that of last year. The business was started by Mr. James Dougall in 1922 with about seven hands. An indication of the growth of the business was that in October last they turned out 1200 repaired and 250 new meters. Mr. Dougall, in reply, said that during the year their automatic meter had been placed on the market; and wherever it had been demonstrated it had met with every success.

New Companies.—A recent registration is Yorkshire Coal Products, Ltd., to carry on the business of distillers, extractors, manufacturers, and suppliers of all solid, liquid, and gaseous substances or matter in any manner derived from coal, or from the derivatives of, or residuals obtained from, coal. The nominal capital is £100. The C. & B. P. Syndicate has been formed to acquire interests in patents, &c., in relation to the emulsification of tar. The nominal capital is £100. Sitora, Ltd., registered as a private company with a nominal capital of £200, will carry on business at Standart Works, Tottenham, as manufacturers, refiners, and producers of vegetable oils, naphtha, coal bye-products, fertilizers, and chemicals.

The Smoke Nuisance in the Manchester District.—Following a requirement of the Ministry of Health, representatives of 66 local authorities in the Manchester and district town-planning area met last week, under the chairmanship of the ex-Lord Mayor (Alderman W. T. Jackson), to appoint a Committee to bring about a uniform administrative system in connection with smoke abatement. After considerable discussion, sixteen members were appointed, with the addition of Alderman Jackson as Chairman, and Dr. Veitch Clark, the Manchester Medical Officer of Health. In the view of the meeting all that was possible should be done to avoid injuring the trades which are considered to be most concerned in the creation of the smoke nuisance. The hope is entertained by the Ministry of Health that uniformity in regard to penalties and to the degree of restrictions will be introduced in the area.

Smoke Abatement and Central Heating.—The Departmental Committee on Smoke and Noxious Vapours Abatement, in their report dated June 1, 1920, recommended that the Central Housing Committee should decline to sanction any housing scheme unless specific provision were made in the plans for the adoption of smokeless heat, except where this was impracticable, and that gas and electricity undertakers should be given every facility and encouragement to cheapen their products. The Housing Committee of the London County Council have considered the adoption of central heating for the Council's dwellings; but the installation costs, with the existing restrictions under the London Building Acts, are prohibitive. With regard to hot water supply, the Committee think the question is one which should be further explored, and suggest that in the next block of dwellings an experimental installation for constant hot water should be provided.

Chapel Whaley Gas Company.—In their fifteenth annual report, the Directors of the Chapel Whaley and District Gas Company state that there has been a profit on the past year's working of £6422. They recommend a dividend which will make the total distribution for the year £7 1s. p.ct.; and there will be carried forward £3949.

Bakewell Gas Prices.—The Bakewell Urban Council are reducing the price of gas from 5s. 10d. to 5s. per 1000 c.ft. for private lighting, and from 5s. to 4s. 2d. for public lighting, heating, and power. The first report of the Gas Examiner (Mr. John White) has been received by the Council, and states that the Bakewell ratepayers will be glad to know that, in the matter of gas, they are getting full value for their money. The Council have undertaken to supply gas of 500 B.Th.U., but his test showed that they are supplying 600 B.Th.U. gas.

Doncaster Gas Prices Reduced.—The Doncaster Town Council have decided to reduce by ¼d. per therm the price of gas supplied to consumers in the borough. The reduction is to come into operation on Jan. 1. The Chairman of the Gas Committee (Mr. Crookes) has issued a statement pointing out that the new price will be 9¾d. per therm for general purposes and 8¾d. per therm for power. They were charging in 1920 5s. per 1000 c.ft., but the Committee aimed at reducing the price at the earliest possible moment, and the rate now worked out at 3s. 7¾d. per 1000 c.ft. The Committee had been enabled to reduce the price, despite the increased cost of coal and labour, as the result of the installation of new plant some two years ago.

Stokesley Council and the Yarm Gas-Works.—It was reported at a meeting of the Stokesley Rural Council that the Stockton-on-Tees Gas Order [*ante*, p. 523] had been successfully opposed, and that the position now was that Stockton could only manufacture gas at Yarm in a period of emergency. Mr. J. G. Hedley expressed thanks on behalf of the Yarm ratepayers for the way in which the Council's Clerk (Mr. W. C. Fawcett) had conducted the opposition. The Clerk explained that the original clause of the Draft Order was struck out entirely, and was superseded by one which provided that the Stockton Corporation should not make gas at Yarm except in cases of real emergency caused by the breakdown of the works or plant at Stockton, and then only for such time as the emergency continued.

Derby Gas Company.—The Company's annual staff dinner was held last week. The staff invited as guests Mr. J. Ferguson Bell (Engineer and General Manager), Mr. H. Bullivant (Secretary), and the retired officers of the Company. After dinner the gathering was presided over by Mr. J. P. M'Crae, the Assistant Engineer. In proposing the toast of "The Guests," Mr. M'Crae eulogized the work Mr. Bell had done and was doing both in the gas industry and in municipal affairs. The Derby Gas Company had received a compliment second only in importance to the honour Mr. Bell himself had attained by his being appointed President of the Institution of Gas Engineers. As a small memento, Mr. M'Crae, on behalf of the staff, handed his chief a gold fountain pen, and in so doing conveyed the good wishes of the entire staff. He also referred to Mr. Bullivant, who, he said, was always ready to give them the benefit of his wide experience. The toast was received with musical honours. Mr. Bell, in reply, said he was proud of his staff and of the Company. He assured them that if they desired the best results, they must be prepared to give of their best. He thanked them for the gift of the pen.

Lighting Trades Limited Staff Dinner and Dance.—On Friday last, at the Piccadilly Hotel, the staff of Lighting Trades Limited, of Garratt Lane, Wandsworth, S.W., to the number of 144, were the guests of the Directors of the Company at the second annual dinner and dance. Mr. H. J. Mitchell, the Chairman of the Company, presided at the dinner (which was served in the Georgian Room), and was supported by other members of the Board. The loyal toast having been duly honoured, Mr. Mitchell expressed the pleasure it gave him and his fellow Directors in again being among the members of the staff, to whom he accorded thanks for their continued loyal services. In referring to the Company's position, he mentioned that on the occasion of their last dinner he had referred to the trying times through which they had passed. His views then were optimistic, and he was pleased to be able to say his optimism was justified. They had, however, still to contend with unfair German competition. Mr. A. T. Metcalfe (the General Manager), in proposing the toast of "The Chairman and Directors," which was received with musical honours, returned thanks on behalf of the staff. The rest of the evening was spent in dancing, which was entered thoroughly into by all.

A Torquay Summons.—An unusual case came before the Torquay magistrates recently, when J. F. Jenkins, of Meadfoot House, Torquay, was charged with obstructing an inspector of gas meters employed by the Torquay Corporation in the execution of his duty. Prosecuting, the Town Clerk stated that some time ago defendant took over and used as a furniture store premises known as the Mission Hall, in Park Road, St. Marychurch. The gas was left on; no notice having been received asking for it to be disconnected. When the gas inspector visited the premises, he was unable to get at the meter; defendant stating that it would take a couple of days to make a passage through the furniture. He told the inspector that if any damage was done to the furniture he would hold the Corporation responsible. In cross-examination W. J. Hunt, the gas inspector concerned, and W. J. Franks, a fitter, stated that when it was found impossible to reach the meter, defendant offered to pay for whatever quantity was shown to have been consumed, but said it might be several years before the furniture was removed. After the evidence had been given, defendant, who pleaded not guilty, intimated that he was willing to give an undertaking to pay for the cost of the meter at once, to authorize the Corporation to cut off the supply at once, and to pay for any gas which the meter was found to have registered when it was possible to gain access to it. He said he had not used any gas, and he did not intend to use any. These terms were accepted by the Corporation, and the case was therefore dismissed.

NORTH-EAST COAST COAL TRADE.

From our Own Correspondent.

The week began with a continuance of the brighter tone which had been in evidence during the previous week, and there were all-round inquiries which gave rise to hopes that a serious expansion of business was beginning. Two of the reasons for the temporary increase in trade appear to have been a few orders for cargoes to the coaling stations, attracted no doubt by the low prices ruling, and orders for coking coal to Belgium, connected in some way with delay in deliveries of reparation coal from Germany. But towards the end of the week there was a distinct weakening throughout, and, after advancing in some cases sixpence to a shilling a ton, prices began to slip back.

Best Durham gas coals were hardly affected, though perhaps seconds were a little harder during the week. Many forward inquiries are for periods from April next year; Christiania, for instance, being in the market for that period. Collieries are anticipating better prices about that time, as consumers will probably be taking in stocks as a precaution against possible trouble when the wages agreement terminates in June.

Nominal quotations for Wear Special gas makes are 22s. to 22s. 6d. f.o.b., and 21s. 6d. for best qualities. Seconds are 18s. to 18s. 6d.

COAL TRADE IN THE MIDLANDS.

From our Local Correspondent.

There are continued complaints of the slowness of transport between the pits and the wharves. While the Wembley Exhibition was running, delays were excused on the ground of the large diversion of engine power and necessary re-arrangements of the traffic. Traders were promised that when the Exhibition closed mineral traffic would be speeded-up. Thus far there is very little improvement, and considerable loss, as well as inconvenience, results. Wagon owners do very well if they manage to keep on the right side of the account. There is not much change in the trade position. The gas coal market is uneventful. Engineers take their quota, but have no call for more. Very quiet conditions persist in the house coal trade; while values are unchanged, the undertone is not too strong. Till they are spurred by the weather, consumers will not willingly pay the difference between summer and winter prices. The improvement as regards nuts and beans continues. Slacks are cleared for the most part at an even pace with production. Collieries in the South Midlands are better off in this respect than those of Lancashire and Yorkshire. Most of the pits are working about five days a week.

The recent stiffening in blast-furnace coke can be traced partly to larger requirements for both home and export and partly to curtailment of output. No steps have been taken for the re-opening of negotiations for forward supplies to Midland furnaces. The smelters think they ought to be assured of coke at 15s. at ovens. Collieries are willing to continue the present basis of 16s. 9d., to which prices on the open market now conform.

YORKSHIRE AND LANCASHIRE COAL TRADE.

From our Local Correspondent.

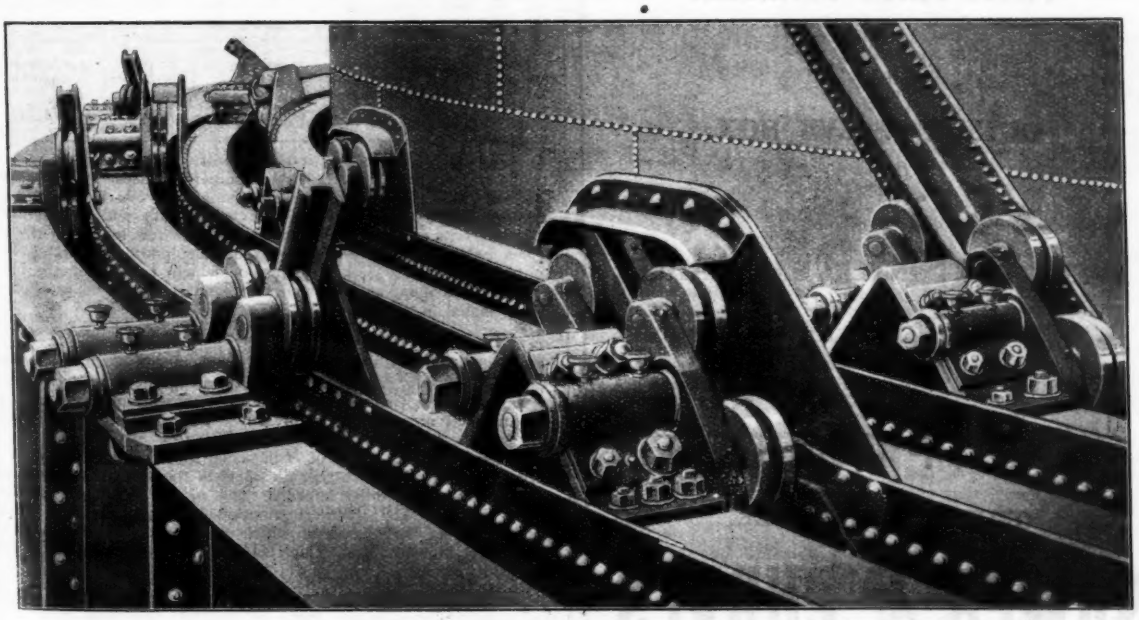
Gas coals in the open market in Yorkshire and Lancashire are moving more freely, solely by reason of the longer nights and darker days, although some big consumers are finding it difficult to take out their contracts, with the result that current figures are well below the contract rates.

Gas coke is much easier, and is being freely offered at several shillings per ton below the figures that ruled a few weeks ago. This is probably due to the lack of export orders; the f.o.b. Hull price being now about 30s. Furnace coke for inland consumption is rather stronger, while for export it remains steady at about 22s. 6d. f.o.b. Hull.

The Continental buyers of English coal are not sending many inquiries, with the result that the commoner qualities are at a discount, although South Yorkshire hards remain fairly firm, especially in comparison with the current price for Tyne D.C.B.'s.

The house coal trade remains on the quiet side, and there is no apparent improvement in the demand for home consumption. Many merchants report stocks which they desire to clear before engaging in further purchases. The period betwen now and Christmas may show some alteration, although the mild weather now being experienced militates against increased consumption. The beneficial results to trade anticipated from the General Election have not yet accrued, and while there are one or two isolated instances of improvement, the majority of consumers of industrial coal do not so far feel justified in purchasing coal ahead to any great extent. The heavy woollen district of Yorkshire continues to be very dull, and it must be some time before a normal state of affairs prevails. In Lancashire, where the market generally is healthier, industrial coal is rather more active, as the cotton mills are buying better. Prices have not been altered at the pits.

Prices at Hull at the week-end were: Bunkers—Yorks, Derby, and Notts, large screened steam f.o.b. Humber ports, 17s. 6d. to 20s. Cargo for export—Best Yorks hards, Association, 22s. 7½d. to 22s. 9d.; Derby best hards, 22s. 6d. to 24s.; West Yorks Hartleys, 18s. 6d. to 22s.; South Yorks washed doubles, 21s. to 21s. 6d.; South Yorks washed singles, 19s. 6d. to 20s.; dry doubles, 14s. 6d. to 16s.; South Yorks washed smalls, 15s. to 15s. 6d.; Derby slack, 1 in., 10s.; South Yorks rough slack, 10s. 6d. to 11s.; gas coke, 29s. to 31s.; furnace coke, 22s. 6d. to 23s.; washed smithy peas, 23s. to 24s.; washed steam thirds, 19s.; South Yorks washed trebles, 21s. 6d.



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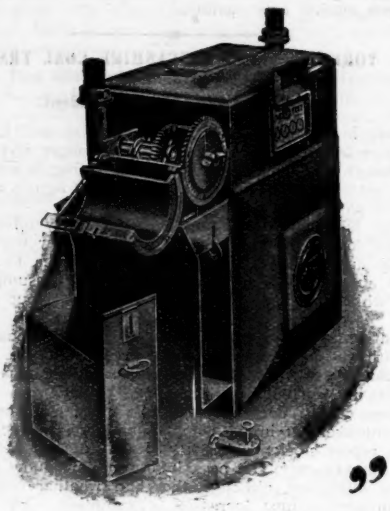

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CURRENT SALES OF GAS PRODUCTS.

The London Market for Tar, Tar Products, and Sulphate.

LONDON, *Dec.* 8.

There is little change in the market for pitch. Although it is reported in one or two directions that higher prices are being paid, the market has not yet settled at such higher level, but is undoubtedly firm at from 50s. to 52s. 6d. per ton at makers' works. Creosote shows a hardening tendency, and a fair amount of business is offering. The price is steady at about 6¼d. per gallon net and naked at makers' works. Owing to scarcity of supplies, all white spirits are higher in value; solvent naphtha being about 1s. 7d. to 1s. 8d. per gallon for 95/160 quality, and pure toluole and pure benzole about 1s. 10d. to 2s. per gallon.

Tar Products in the Provinces.

Dec. 8.

There has been no material change in the market for tar products during the past week. Pitch remains steady, and there is still a little buying going on. Solvent naphtha and benzoles are in good demand. Creosote is steady, with a fair amount of inquiry.

The average values for gas-works products during last week were: Gas-works coal tar, 31s. to 36s. Pitch, East Coast, 50s. to 52s. 6d. f.o.b. West Coast—Manchester, 46s. 6d. to 47s. 6d.; Liverpool, 48s. to 49s.; Clyde, 50s. to 51s. Benzole 90 p.ct., North, 1s. 4d. to 1s. 5d.; crude 65 p.ct. at 120° C., 9¼d. to 10¼d. naked at makers' works; 50-90 p.ct. naked, North, 1s. 2d. to 1s. 3d. Toluole, naked, North, 1s. 4d. to 1s. 5d., nominal. Coal tar crude naphtha in bulk, North, 7¼d. to 8d. Solvent naphtha, naked, North, 1s. 4d. to 1s. 6d. Heavy naphtha, North, 1s. 1d. to 1s. 2d. Creosote, in bulk, North, liquid, 5⅛d. to 5⅜d.; salty, 5⅛d. to 5¼d.; Scotland, 5¼d. to 5⅝d. Heavy oils, in bulk, North, 6¾d. to 7d. Carbolic acid, 60 p.ct., 1s. 7d. to 1s. 8d. prompt. Naphthalene, £13 to £15; salts, £4 to £7, bags included. Anthracene, "A" quality, 3½d. per minimum 40 p.ct., purely nominal; "B" unsaleable.

British Sulphate of Ammonia Federation Prices.

The British Sulphate of Ammonia Federation, Ltd., in announcing their home prices for the spring season, write:

"The quantity of sulphate of ammonia we have sold for home use during the past five months already exceeds by 40 p.ct. the total sold for the corresponding period in 1923. A portion of this increase no doubt represents early buying, due to appreciation by buyers of the exceptionally favourable terms on which sulphate has been offered during the summer and autumn months. But we are persuaded that a considerable part of the purchases indicates increased consumption. Agricultural conditions would appear to warrant a further large increase in demand for the spring; and we therefore desire to urge consumers to order early to avoid disappointment. Supplies are still available for delivery in December at £14 8s. per ton.

"We offer to sell sulphate of ammonia for home agricultural use at the following prices:

January, 1925.	February, 1925.	March-May, 1925.
£14 10	£14 12	£14 14

for neutral quality in fine friable condition, free from lumps, basis 21·1 p.ct. nitrogen, delivered to consumer's nearest station or wharf in Great Britain, for prompt cash payment, in lots of 4 tons and upwards. Limited quantities of ordinary quality will be available in some districts, and will be sold at 23s. per ton less than the above prices, basis 20·7 p.ct. nitrogen. Neutral sulphate, guaranteed not to contain more than 0·025 p.ct. free acid, will be sold on the basis of 21·1 p.ct. nitrogen, with no charge if over 21·1 p.ct." The allowances are as stated in the "JOURNAL" for July 2, p. 196.

Sheffield Gas Company's Sports and Social Club.—The annual tea, concert, and distribution of prizes in connection with this club was held at the Grimesthorpe Works, Sheffield, on Nov. 29. Over two hundred members were present. The gathering was presided over by Mr. Ralph Halkett, General Manager of the Company, who remarked on the pleasure of such social gatherings, and hoped that during the next season further members of the staff would avail themselves of the opportunity afforded them of healthful exercise during leisure hours. Mr. Halkett mentioned particularly the splendid ground now at their disposal, which is laid out for football, cricket, bowls, and tennis. Mrs. Ralph Halkett presented the prizes to the successful members.

Belfast Gasholder Contract.—Reporting to the Belfast Corporation with reference to the legal proceedings instituted by Mr. John Graham, in respect to the contract for the recent erection of the big holder at the gas-works, the Town Solicitor intimated that Mr. Graham had appealed against the decision of the Court, when the Corporation were successful in their application to have proceedings stayed and to refer the matters in dispute to arbitration, as provided by the contract; that upon the hearing of the appeal negotiations for a settlement had taken place; and that, after much discussion, it had been agreed, subject to the approval of the Corporation, that the Corporation should pay a sum of £6000 in full settlement of the claim of £24,378. He stated that this sum included an item of £2000 retention money under the contract, in respect of which there was no question of the Corporation's liability, and that the Manager of the gas-works (Mr. J. D. Smith) and Counsel for the Corporation recommended the settlement to the favourable consideration of the Council. The Corporation confirmed the settlement.

STOCK MARKET REPORT.

THERE was an air of confidence in the Stock Exchange Markets last week. The settlement of the Egyptian differences, the completion of the Anglo-German trade treaty, and the announcement of the Greek Refugee Loan, all contributed to the feeling that better times are in store for Europe. There was an enormous demand for the Greek Loan prospectuses, and the success of the Loan is a foregone conclusion. As early as Friday last dealings took place at 2 premium.

From the statistics compiled by the Midland Bank, it is seen that there has been a substantial increase in the amount of capital borrowed by foreign countries on the London market; during 1924 and by the end of the year the total will closely approach the sum of £60,000,000.

Gilt-edged stocks remained steady, and it is not surprising that the 5 p.ct. War Loan continues in demand, as it is the best and cheapest gilt-edged stock available. The Foreign Market was more animated than usual. The Hungarian and German Loans and Turkish Unified all improved in price. The Peruvian Corporation issues and Brazilian bonds were also in demand.

In the Industrial and Tea Markets there were two "Xmas Boxes" distributed. The reports of Carreras and Consolidated Tea and Lands with their bonus announcements were very pleasant reading to the lucky shareholders. There was a revival of interest in the Textile department, including Courtaulds and Bradford Dyers. Swedish Match "A" and Associated Portland Cement were also a better market.

There is little to record in the Gas Market. It will be seen from the Table that quotations continue to improve. One exception, for which no reason can be assigned, is the fall of 2 points in the Plymouth and Stonehouse Company 5 p.ct. stock. Business was done at 110-110½, and at the average price of 112½ the yield is exactly 7 p.ct.—a very attractive investment.

The following transactions were recorded during the week:

On Monday, Bournemouth 5 p.ct. 13¼, Brentford "B" 116½, 117, British 118, Commercial 4 p.ct. 95, European 8½, Gas Light and Coke 95⅛, 95¼, 95⅜, 95½, 95⅝, 95⅞, 96, 96¼, 3½ p.ct. maximum 62 13/16, 63½, 4 p.ct. preference 80, 80⅛, 80⅜, 3 p.ct. debenture 62, Imperial Continental 175 *ex* div., Primitiva 8s. 9d., San Paulo 6 p.ct. preference 7 9/16, 7 11/16, South Metropolitan 100, 100¼, 100⅜, South Suburban 5 p.ct. 108½, 5 p.ct. debenture 99, Tottenham "B" 102, 103. Supplementary prices, Danish 4 p.ct. debenture 77.

On Tuesday, Alliance and Dublin 65⅝, 65 11/16, 66¼, Bombay 5 3/16, Brentford "A" 116, Commercial 4 p.ct. 95⅛, Croydon max. div. 86, 87, European 8 3/16, Gas Light and Coke 95⅛, 95⅜, 95½, 95⅝, 95¾, 96, 3½ p.ct. maximum 64, 3 p.ct. debenture 62, Imperial Continental 177 *ex* div., Liverpool 7 p.ct. preference 101½, Primitiva 8s. 6d., 8s. 10¼d., South Metropolitan, 100¼, 100½, 100⅝, South Suburban 5 p.ct. 107, 107½. Supplementary prices, Pinner 6 p.ct. preference 5 15/16, Walton-on-Thames and Weybridge 7 p.ct. max. "B" 11.

On Wednesday, Brighton and Hove original 175, British 117, Commercial 4 p.ct. 95, Gas Light and Coke 95⅛, 95⅜, 3½ p.ct. maximum 63, 4 p.ct. preference 79¾, 80, 80¼, 81, 3 p.ct. debenture 62, Imperial Continental 176, 176½, 178 *ex* div., Plymouth and Stonehouse 5 p.ct. 110, 110½, Primitiva 8s. 10¼d., 9s., 4 p.ct. (Buenos Ayres) debenture 61½, 61¾, 4 p.ct. debenture 1911 61¾, San Paulo 5 p.ct. debentures 44, South Metropolitan 100, 100⅛, 100⅜, Tottenham "B" 103. Supplementary prices, Kingston-upon-Thames 105⅜, 105⅞.

On Thursday, Brighton and Hove original 175, 175½, European 8½, Gas Light and Coke 95, 95⅛, 95⅜, 95½, 95⅝, 95⅞, 4 p.ct. preference 80, 80⅛, 80⅜, 81, 3 p.ct. debenture 62, 61½, Imperial Continental 178, 178½, Primitiva 8s. 6d., 4 p.ct. debenture 1911 61¾, South Metropolitan 100½, 101⅛, Tottenham "B" 102½. Supplementary prices, Barnet "A" 149½, "C" 148½, 149, "D" 107⅜, 108¼.

On Friday, Brentford "A" 116, 116½, British 118, Gas Light and Coke 95, 95⅛, 95¼, 95½, 95⅜, 3½ p.ct. maximum 63, 4 p.ct. preference 80, 80⅛, 3 p.ct. debenture 62, Imperial Continental 177½, Primitiva 8s. 7½d., 8s. 9½d., 8s. 10½d., South Metropolitan 101, 101⅛, South Suburban 5 p.ct. 108⅞, Tottenham "B" 103, Wandsworth "B" 122. Supplementary prices, British (Hull) 4 p.ct. mt. debentures 73½, 74, (Norwich) 3½ p.ct. mt. debentures 63¼, 64, 4 p.ct. mt. debentures 73⅜, 74, (Potteries) 3 p.ct. mt. debentures 54, 54½, South Suburban 7 p.ct. debenture 104.

Very abundant supplies of loanable funds were available in Lombard Street, and lenders accepted as low as 1½ p.ct. for end of the day balances. Generally, however, from 2 to 2½ p.ct. was paid. The payment of the instalment on the German Loan had no noticeable effect on the market. Treasury Bills were allotted at an average of £3 12s. 3·17d. p.ct., being 7·62d. below the average rate of the previous week.

In the Foreign Exchange Market the chief interest during the past week was centred in the Sterling rate on New York. The rate steadily improved from 4.63 dollars, until at one time on Frday it touched 4.69 dollars to the £ sterling. This is the highest rate since March of last year. On Saturday the closing price was 4.68¼. French francs closed at 86.95, and Belgian francs at 95.05. Italian lire were a better market at 107.85.

The price of Silver fell during the week, and closed on Saturday at 32 1/16d. per oz. for cash.

The Bank rate is 4 p.ct., to which it was raised from 3 p.ct. on July 5, 1923. Bankers' deposit rates are 2 p.ct. The deposit rates of the discount houses are 2 p.ct. at call and 2¼ p.ct. at notice.

Issue.	Share.	When ex-Dividend.	Dividends. Prev. Hf.Yr.	Dividends. Last Hf. Yr.	NAME.	Quotations. Dec. 5.	Rise + or Fall − on Week.	Transactions Lowest and Highest Prices.
£			%p.a.	%p.a.				
171,978	Stk.	Aug. 14	5	5	Aldershot 5 p.c. max. C.	80—83	..	..
235,492	,,	,,	4	4	Do. 4 p.c. Pref.	72—77	..	..
1,551,868	,,	Sept. 25	6	6½	Alliance & Dublin Ord.	64—69	+2	65⅛—66½
374,000	,,	July 10	4	4	Do. 4 p.c. Deb.	63—68	..	..
300,000	5	Oct. 23	8	8	Bombay, Ltd.	4—5⅛	..	5 5/16
100,000	10	Aug. 14	8½	8½	Bournemouth 5 p.c.	12½—13¾	..	13¾
425,050	10		7	7	Do. B 7 p.c.	12½—13	..	..
150,000	10	,,	6	6	Do. Pref. 6 p.c.	10½—11½	..	..
50,000	Stk.	June 26	3	3	Do. 3 p.c. Deb.	57—60	..	..
162,025	,,	,,	4	4	Do. 4 p.c. Deb.	77—80	..	..
992,045	,,	July 10	6 1/16	6 1/16	Brentford A Con.	114—119	..	116—116½
990,500	,,	,,	6½	6½	Do. B New	114—119	..	116¼—117
76,000	,,	,,	5	5	Do. 5 p.c. Pref.	89—94	..	..
306,690	,,	June 12	4	4	Do. 4 p.c. Deb.	75—80	..	..
181,337	,,	,,	—	6	Do. 6 p.c. Rich. Red. Deb.	100—105	..	..
214,740	,,	Aug. 28	11½	11½	Brighton & Hove Orig.	170—175	..	175—175½
244,200	,,	,,	8½	8½	Do. A Ord.	125—128	..	..
1,887,500	,,	July 24	5	5	Bristol 5 p.c. max.	92¼—93¼*a*	..	..
855,000	,,	Sept. 25	7	8	British Ord.	115—120	..	117—118
100,000	,,	June 26	7	7	Do. 7 p.c. Pref.	125—130	..	..
120,000	,,	,,	4	4	Do. 4 p.c. Red. Deb.	72—77	..	..
100,000	10	May 22	6	8	Cape Town, Ltd.	7—8	..	..
100,000	10	Nov. 6	4½	4½	Do. 4½ p.c. Pref.	6—7	..	..
150,000	Stk.	June 26	4½	4½	Do. 4½ p.c. Deb.	72—77	..	..
626,860	,,	July 24	6	6	Cardiff Con. Ord.	97—100	..	..
237,860	,,	June 26	7½	7½	Do. 7½ p.c. Red. Deb.	103—106	..	..
137,150	,,	Aug. 14	6½	5	Chester 5 p.c. Ord.	86—91*b*	..	..
1,513,280	,,	July 24	6	6	Commercial 4 p.c. Cap.	94—97	+1	95—95½
560,000	,,	,,	6	6	Do. 3½ p.c. Cap.	94—97	+1	..
475,000	,,	June 12	3	3	Do. 3 p.c. Deb.	58—61	..	..
800,000	,,	14 Jan. 15	—	—	Continental Union, Ltd.	37—42	..	..
200,000	,,	June 12	7	7	Do. 7 p.c. Pref.	89—94	..	..
660,000	,,	Aug. 28	6½	6½	Croydon sliding scale	101—104	..	..
284,975	,,	,,	5	5	Do. max. div.	84—87	..	86—87
492,270	,,	Aug. 28	9	6	Derby Con.	107—110*c*	..	..
55,000	,,	July 10	4	4	Do. Deb.	74—76*c*	..	..
1,002,180	10	July 24	2	6	European, Ltd.	8—9	..	8⅛—8½
16,503,045	Stk.	Aug. 14	5½	5½	Gas Light & Coke 4 p.c. Ord.	95—97	..	95—96½
2,600,000	,,	,,	3½	3½	Do. 3½ p.c. max.	61—64	..	62 7/16—64
4,064,235	,,	,,	4	4	Do. 4 p.c. Con. Pref.	79—81	..	79½—81
4,761,930	,,	June 12	3	3	Do. 3 p.c. Con. Deb.	60—63	..	61—62
130,000	,,	—	10	10	Do. 10 p.c. Bonds	..	..	..
42,000	,,	—	7½	7½	Do. 7½ p.c. Ilford Deb.	..	..	..
82,500	,,	Sept. 11	6½	6½	Hastings & St. L. 5 p.c. Conv.	95—100	..	..
258,740	,,	,,	5½	5½	Do. 3½ p.c. Conv.	75—80	..	..
70,000	10	Sept. 25	10	10	Hongkong & China, Ltd.	16—17	..	..
86,600	Stk.	Aug. 14	10	10	Hornsey 7 p.c.	138—143	..	..
1,976,000	,,	Nov. 20	30	10	Imperial Continental Cap.	174—179	+2	175—178½
263,950	,,	Aug. 14	3½	3½	Do. 3½ p.c. Red. Deb.	70—73	..	..
235,242	,,	Aug. 14	6½	6½	Lea Bridge 5 p.c. Ord.	97—102	..	..
2,127,340	,,	Aug. 14	5½	5½	Liverpool 5 p.c. Ord.	91—91½*b*	..	..
600,000	,,	Sept. 25	7	7	Do. 7 p.c. Red. Pref.	104—107*b*	+2	101½
165,736	,,	Aug. 28	8	9	Maidstone 5 p.c. Cap.	125—135	..	..
63,480	,,	June 26	3	3	Do. 3 p.c. Deb.	55—60	..	..
75,000	5	Dec. 4	7	5	Malta & Mediterranean	3½—3¾*	−⅛	..
541,920	Stk.	Nov. 20	4	4	Montevideo, Ltd.	60—65	+2	..
1,875,892	,,	July 24	5½	5	Newcastle & Gateshead Con.	83½—84*d*	−½	83½
250,166	,,	,,	4	4	Do. 4 p.c. Pref.	74—75*d*	..	..
529,705	,,	June 26	3½	3½	Do. 3½ p.c. Deb.	69—71*d*	..	..
15,000	10	Aug. 28	11	11	North Middlesex 10 p.c.	16—17	..	..
75,940	10	,,	7 7/16	7 7/16	Do. 7 p.c.	11½—11¾	..	..
300,000	Stk.	Dec. 4	7	9	Oriental, Ltd.	98—101*	−2	..
138,120	,,	June 26	7¼	7½	Plym'th & Ston'house 5 p.c.	110—115	−2	110—110½
60,000	50	Aug. 28	13	13	Portsea Island B	99—102	..	..
100,000	50	,,	12	12	Do. C	95—100	..	..
2,289,909	1	—	—	—	Primitiva Ord.	8/0—9/0	..	8/6—9/0
311,100	100	Dec. 1	4	4	Do. 4 p.c. Red. Deb.	76—79*	..	..
600,000	Stk.	July 24	4	4	Do. 4 p.c. Red. Deb. 1911	61—63	+½	61½
220,335	,,	June 26	4	4	Do. B. Aires 4 p.c. Rd. Db.	61—63	+½	61½—61½
321,670	,,	,,	4	4	Do. R'r P'te 4 p.c. Rd. Db.	61—63	+½	..
150,000	10	Sept. 25	6	6	San Paulo 6 p.c. Pref.	7½—7¾	..	7 15/16—7 15/16
125,000	50	July 1	5	5	Do. 5 p.c. Red. Deb.	42—44	..	44
270,000	Stk.	Aug. 28	5/8/4	5½	Sheffield A	103—105*e*	..	..
419,968	,,	,,	5/8/4	5½	Do. B	103—105*e*	..	..
1,047,000	,,	,,	5/8/4	5½	Do. C	103—105*e*	..	..
90,000	10	Oct. 23	8	6	South African	7—9	..	..
6,609,895	Stk.	Aug. 14	6½	5	South Met. Ord.	100—102	+⅛	100—101½
102,580	,,	July 10	5	5	Do. Red Pref.	98—100	..	..
1,895,445	,,	,,	3	3	Do. 3 p.c. Deb.	60—63	..	..
734,000	,,	Sept. 11	6½	6½	Do. 6½ p.c. Red. Deb.	104—106	+1	..
91,500	,,	Aug. 28	8½	8½	South Shields Con.	134—136*d*	..	..
1,087,795	,,	Aug. 14	6½	6½	South Suburban Ord. 5 p.c.	105—110	..	107—108⅞
368,837	,,	June 26	5	5	Do. 5 p.c. Deb.	95—100	..	99
647,740	,,	Nov. 6	5	5	South'mpt'n Ord. 5 p.c. max.	83—86	..	..
121,275	,,	June 26	4	4	Do. 4 p.c. Deb.	73—78	..	..
250,000	,,	Aug. 28	7	7	Swansea 7 p.c. Red. Pref.	102—104	..	..
200,000	,,	June 26	6½	6½	Do. 6½ p.c. Red. Deb.	104—106	..	..
120,000	,,	July 24	8	8	Tottenham District A 5 p.c.	118—121	..	..
882,275	,,	,,	6½	6½	Do. B 3½ p.c.	102—105	+2	102—103
182,255	,,	June 12	4	4	Do. 4 p.c. Deb.	76—80	..	..
248,251	,,	Aug. 28	7/14/4	5	Tynemouth Con. and New	84—86*d*	..	..
187,294	,,	Aug. 28	6½	6½	Uxbridge, Maidenhead, & Wycombe 5 p.c.	102—107	..	..
68,330	,,	Aug. 28	—	5	Do. 5 p.c. pref.	95—100	..	..
97,800	,,	—	—	—	Do. 5 p.c. Maidenh'd	100—105	..	..
					Wandsworth, Wimbledon, and Epsom—			
30,000	,,	July 10	9½	9½	Wandsworth A 5 p.c.	140—145	..	..
255,636	,,	,,	7½	7½	Do. B 3½ p.ct.	120—125	..	122
107,075	,,	,,	6/7/9	6/9/6	Do. C	102—107	..	..
219,865	,,	,,	6/7/9	6/9/6	New Ordinary	..	..	..
352,000	,,	,,	7½	7½	Wimbledon 5 p.ct.	116—121	..	..
96,000	,,	,,	7½	7½	Epsom 5 p.ct.	122—127	..	..
69,416	,,	June 26	3	3	5 p.c. Deb.	58—61	+2	..

Quotations at:—*a.*—Bristol; *b.*—Liverpool. *c.*—Nottingham. *d.*—Newcastle. *e.*—Sheffield. * Ex. div.

TRADE NOTES.

"S.E.A. Ring" Packing.

Messrs. Ronald Trist & Co., Ltd., Engineering Specialists, of 12, Clipston Street, Great Portland Street, London, W. 1, have prepared a small album (S. 19), in five languages, showing "S.E.A. Ring" packings applied to various machines. This will prove very useful.

"Supastone" Glassware.

The Wholesale Fittings Company, Ltd., Commercial Street, London, E. 1, have published a new catalogue describing their well-known three-ply glass. A coloured plate of their hand-painted shades gives an excellent idea of the finish and charm of these decorative fittings.

Pulverized Fuel.

Messrs. Vickers & International Combustion Engineering, Ltd., Africa House, Kingsway, W.C. 2, have recently received three important orders for pulverized fuel plant. One of these is from Synthetic Ammonia & Nitrates, Ltd., for a complete boiler-house equipment to include two water-tube boilers fixed with pulverized fuel; this being the first section of a plant which will eventually be six times the size. The other orders are from a cement plant at Holborough, Kent, and from the St. Pancras Station. The latter is a repeat order.

Smoke Prevention.

During the past three months Messrs. Meldrums Limited, of Timperley, have received many orders for their plant. These include furnaces and stokers for 25 boilers of various types, 27 destructors (from the small domestic apparatus to burn 25 lbs. of refuse per hour to the brick-built cell to burn over 1 ton of sawdust per hour—both with and without waste heat utilization—and also municipal types), and 50 units of steam jet apparatus such as ejectors, silent boiling jets, compressors, pumps, &c., in "Meldrum" and other acid-resisting metals.

EXTENSIONS.

The Blackburn Town Council, on Dec. 4, referred to a Special Committee the question of providing a gasholder at the Greenbank Gas-Works, and the renewal of the oil gas plant at the Addison Street Gas-Works, estimated to cost £45,000 and £15,000 respectively.

At a recent meting of the Burton-on-Trent Gas Committee the Manager (Mr. W. Wilson) submitted an estimate for the erection of a pan ash and breeze washing plant from Messrs. George Waller & Son, Ltd., of Stroud, at a sum of £2185. This estimate was accepted.

At a meeting of the Stoke-on-Trent Gas Committee, the Engineer (Mr. Alexander Mackay) reported on the saving of combustible material which could be effected by the installation of a coke separator plant; and he was instructed to obtain tenders for the supply of such plant.

The Carlisle Gas Committee have made further application to the Unemployment Grants Committee to approve of schemes for the extensions of mains, suggesting that the question of obtaining the necessary pipes should be left to the Corporation.

The Stafford Gas Committee reported to the Town Council last week that they had made an application to the Unemployment Grants Committee for a grant towards the relining of two sets of vertical retorts.

Darkness and Disease.—The Medical Correspondent of "The Times," in the issue for Dec. 4, says that "during the past two days no ultra-violet rays have reached London. The city, in short, has suffered 60 hours of continuous 'darkness' in so far as the healing and tonic rays of the sun are concerned. That is a great stimulus to disease, since for children and the weak, darkness is scarcely less detrimental than the loss of sleep. The reason is, largely, the smoky condition of the atmosphere."

Messrs. W. Day & Sons, auctioneers, of High Street, Maidstone, report an auction sale of £1825 5 p.ct. capital stock in the Maidstone Gas Company last Thursday, at £128 to £130 p.ct.

A fine of £5 and costs was inflicted at Sheffield Police Court on Alfred Mason, who was charged with having unlawfully laid a pipe to supply gas to his house without the Sheffield Gas Company's consent. He pleaded guilty.

The Leeds Corporation have authorized the Town Clerk to apply to the Minister of Health for sanction to borrow £50,000 for gas stoves, fires, and apparatus in connection with slot installations during the year ending Dec. 31, 1925.

After a lapse of twelve years, a trades exhibition has been revived at the Public Hall, Preston. It is being held on a large scale. Among the exhibitors are the Preston Gas Company, who have an excellent display of cooking and lighting appliances.

At a recent meeting of the Whitby Rotary Club, Rotarian Wm. M. Galleway, Secretary and Manager of the Whitby Gas Company, gave a talk on "Gas Manufacture," and afterwards took the members of the Club round the gas-works and explained the process.

At a public auction last week of £2000 of ordinary new "B" stock of the Yeadon and Guiseley Gas Light and Coke Company (a portion of the additional capital of £30,000 authorized to be raised by the Yeadon and Guiseley Act of 1880), purchasing was brisk. The prices realized were from £140 to £141 p.ct.

It was reported at a recent meeting of the Accrington District Gas Board that, as the result of the recent exhibition of gas appliances, orders were still pouring in. Mr. A. J. Harrison (General Manager) stated that during last month they had fixed 304 gas fires, boilers, and cookers, and there were 500 orders still in hand.

The Yeadon Urban District Council, in response to a public demand for better street lighting in the district, have asked the Yeadon and Guiseley Gas Company and the Electrical Distribution Company of Yorkshire to submit schemes and tenders for the lighting and maintenance of street lamps in the township. The present lighting is by gas.

The Torquay Town Council have adopted a recommendation of the Gas Committee that in cases where accounts are not paid within seven days from the date of the demand in each quarter, the Borough Treasurer be authorized at his discretion to give instructions for the supplies to be cut-off until the accounts have been paid, and to take proceedings for the recovery of the amounts due.

Following recent complaints by workers in local textile mills as to poor lighting by the existing gas service, the Sowerby Bridge District Council Gas Committee have had the service investigated by an expert. This report shows that the quality of the gas and the pressure are quite up to standard. The poor lights of which complaint is made are the result of inefficient inferior fittings and negligence on the part of the owners in regard to keeping them in good condition.

The question of whether central premises are needed for the exhibition of gas appliances arose in the Blackburn Town Council last Thursday, when Mr. C. A. Critchley, an ex-President of the Chamber of Trade, and a leading business man, objected to the Corporation acquiring expensive and valuable premises for the gas, electricity, and other undertakings. As these were protected industries, he argued that the policy was an unnecessary and wasteful one. He had objected every time a move of this kind had been made. It was not desirable that premises in the heart of the borough should be used in this way. The reply given by Alderman C. Higham was that the Corporation had as much right to premises in the heart of the business sphere as the private tradesman had; and he protested against the view that the central parts should be reserved for private business. The Corporation schemes were approved.

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